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MOBILE RADIO TELEPHONE SET

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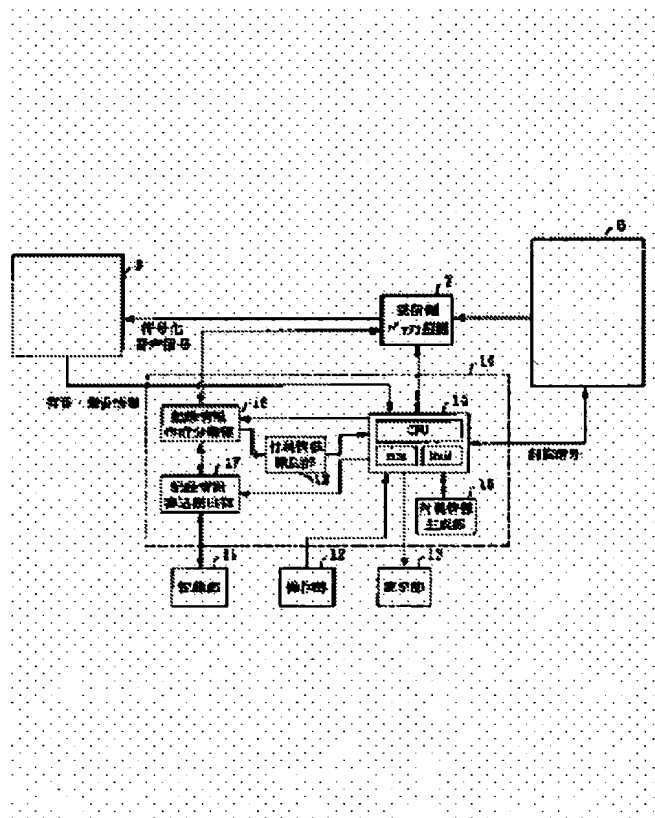
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Abstract of JP9284202

PROBLEM TO BE SOLVED: To record a coded voice signal being a voiced signal for a long time to a recording section by recording accessory information to the recording section when the coded voice signal to be recorded in the recording section is a silent. **SOLUTION:** A control section 14 that detects voice/silence information discriminated by a voice processing circuit section 3 discriminates a silence period of a coded voice signal to be recorded in a recording section 11. Then the coded voice signal discriminated to be in a silence period is not sent to a recording information generating section 16 as it is but the silence information is sent from the control section 14 to an accessory information generating section 15 and the accessory information generating section 15 generates accessory information denoting the silence state. Furthermore, a recording information generator separate section 16 generates recording information based on the accessory information and the voiced coded voice signal. That is, the coded voice signal for a period when discriminated to be silent is replaced with a signal with a comparatively short signal denoting the silent state and the resulting signal is recorded in the recording section 11.



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CLAIMS

[Claim(s)]

[Claim 1] The wireless circuit section to which receives the modulated wave sound signal transmitted from the base station, and it restores to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which it restored by this wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal decoded by this speech processing circuit section, The above-mentioned digitized voice signal is detected with the attached information generation section which generates the attached information which shows the silent condition of the above-mentioned coding sound signal recorded on the above-mentioned Records Department according to the owner sound or silent condition of the above-mentioned digitized voice signal decoded by the Records Department where the above-mentioned coding sound signal is recorded, and the above-mentioned speech processing circuit section. Mobile radio telephone characterized by having the control section which replaces with the coding sound signal of the above-mentioned non-sound the above-mentioned attached information generated by the above-mentioned attached information generation section when the above-mentioned coding sound signal recorded on the above-mentioned Records Department was in a silent condition, and is recorded on the above-mentioned Records Department.

[Claim 2] The wireless circuit section which restores to the modulated wave sound signal from the base station received through the line of contact to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which it restored by this wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal decoded by this speech processing circuit section, The attached information generation section which generates the attached information which shows the communication link condition of the above-mentioned modulated wave sound signal using the circuit information on the above-mentioned line of contact transmitted from the above-mentioned base station, With the Records Department which records the above-mentioned coding sound signal with which the above-mentioned attached information generated by this attached information generation section was added The communication link condition of the above-mentioned coding sound signal which reads the above-mentioned attached information added and recorded on the above-mentioned coding sound signal when reproducing the above-mentioned coding sound signal recorded on the above-mentioned Records Department to the above-mentioned receiver voice, and is reproduced is identified. Mobile radio telephone characterized by having the control section which adjusts the output level of the above-mentioned receiver voice reproduced according to this discernment result.

[Claim 3] The above-mentioned control section is mobile radio telephone given in the 2nd term of a claim characterized by displaying on a display the communication link condition of the above-mentioned coding sound signal reproduced by the above-mentioned receiver voice.

[Claim 4] The wireless circuit section to which receives the modulated wave sound signal transmitted from the base station, and it restores to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which two or more decode means were established and it restored by the above-mentioned wireless circuit section to a

digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal, The attached information generation section which generates the attached information which shows the coding method of the above-mentioned coding sound signal from the encoded information of the above-mentioned modulated wave sound signal transmitted from the above-mentioned base station, When reading the above-mentioned coding sound signal from the Records Department which records the above-mentioned coding sound signal with which the above-mentioned attached information was added and reproducing to a receiver voice The attached information discernment section which reads the above-mentioned attached information added and recorded on the above-mentioned coding sound signal, and identifies the coding method of the above-mentioned coding sound signal, Mobile radio telephone characterized by having the control section which makes the above-mentioned digitized voice signal decode the above-mentioned coding sound signal recorded on the above-mentioned Records Department by the above-mentioned predetermined decode means according to the coding method identified by this attached information discernment section.

[Claim 5] The above-mentioned control section is mobile radio telephone given in the 1st term of a claim, the 2nd term, or the 4th term characterized by what a coding sound signal required for the playback to a receiver voice among the above-mentioned coding sound signals is chosen, and is recorded on the above-mentioned Records Department.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the mobile radio telephone which has the means on which the long duration Records Department is made to record the sound signal transmitted by the message partner about the radiotelephone of a digital method.

[0002]

[Description of the Prior Art] In recent years, the mobile radio communication system which adopted the digital method is advocated, and it is used in the field of a large number, such as a land mobile radiotelephone, a cellular phone, and PHS (Personal Handy Phone System). Moreover, generally in the mobile radio system which adopted the digital method, recording on memory the digitized voice signal encoded as a means to record the contents of a message for a long time on the memory of small capacity as it is is performed.

[0003] For example, the existing voice agreement decode means is formed in JP,7-143223,A, the digitized voice signal encoded by this voice agreement decode means in the state of the message is decoded, and the digitized voice signal encoded where a recording mode is specified by the mode assignment means does not decode, but making the memory of small capacity memorize the sound signal for long duration is indicated by by making a storage means memorize as it is.

[0004]

[Problem(s) to be Solved by the Invention] The coding sound signal of the owner sound condition which has a sound signal when processing loosens in any way and it is not carried out even if it was in the condition that the coding sound signal memorized even if when the conventional mobile radio telephone is constituted as mentioned above and a storage mode is specified is silent, but the Records Department memorizes as it is and the signal section of a silent condition continues for a long time was hardly memorizable.

[0005] Moreover, such mobile radio telephone is what is applied to the migration communication system using a single coding method. In the system which talks over the telephone with the sound signal which two or more coding methods were intermingled and was encoded by each [these] coding method (generally the coding method of these mobile radio system is constituted by the single method (for example, transmission speed carries out in 20ms/frame.)) In gathering the transmission efficiency of the system of these existing further (for example, it carries out [frame] in 40ms /) In order to exchange various situations to not all base stations for the base station which has 40ms [/frame] method of compression in once but to exchange them for 20ms/frame of every several set base stations (two or more coding methods with one system will carry out fixed period mixture.) By the conventional mobile radio telephone which can be used only for a single coding method, it was not able to respond to each coding method. For example, when the contents of a message are memorized moving in the inside of the wireless zone of the base station which used the coding method 1, As for the sound signal memorized by memory when it moved into the wireless zone of the base station which used the coding method 2 by the middle, coding methods differ on the way. Thus, the memorized contents of a message have reproduced only some contents of storage to which a decryption means will not correspond even if it is going to reproduce to a receiver voice, but a coding method corresponds to the receiver voice.

[0006] Moreover, in the field of these mobile radio telephone, it is very useful also from a viewpoint

of a miniaturization and lightweight-izing that the contents of a message of long duration are memorizable in the memory of small capacity.

[0007] [in order that this invention may solve this technical problem, when it is made and records the encoded sound signal on memory] The capacity the silent coding sound signal in memory is remembered to be by memorizing in memory the attached information which replaces with this coding sound signal and shows a silent condition when a coding sound signal is in a silent condition is reduced. It aims at offering the new mobile radio telephone which can carry out the long duration storage of the coding sound signal of an owner sound.

[0008] Moreover, while the coding sound signal for a long time is memorizable in memory, when reproducing the memorized coding sound signal to a receiver voice, the new mobile radio telephone which can tell a user about the output of the receiver voice by the output level according to communication link conditions, such as circuit quality of this coding sound signal and a false error rate, or that of the above-mentioned communication link condition is also offered. Moreover, [0009] [Means for Solving the Problem] The mobile radio telephone concerning invention of the 1st term of a claim The wireless circuit section to which receives the modulated wave sound signal transmitted from the base station, and it restores to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which it restored by this wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal decoded by this speech processing circuit section, The above-mentioned digitized voice signal is detected with the attached information generation section which generates the attached information which shows the silent condition of the above-mentioned coding sound signal recorded on the above-mentioned Records Department according to the owner sound or silent condition of the above-mentioned digitized voice signal decoded by the Records Department where the above-mentioned coding sound signal is recorded, and the above-mentioned speech processing circuit section. When the above-mentioned coding sound signal recorded on the above-mentioned Records Department is in a silent condition, the control section which replaces with the coding sound signal of the above-mentioned non-sound the above-mentioned attached information generated by the above-mentioned attached information generation section, and is recorded on the above-mentioned Records Department is prepared.

[0010] The wireless circuit section which restores to the modulated wave sound signal from the base station which received the mobile radio machine concerning invention of the 2nd term of a claim through the line of contact to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which it restored by this wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal decoded by this speech processing circuit section, The attached information generation section which generates the attached information which shows the communication link condition of the above-mentioned modulated wave sound signal using the circuit information on the above-mentioned line of contact transmitted from the above-mentioned base station, With the Records Department which records the above-mentioned coding sound signal with which the above-mentioned attached information generated by this attached information generation section was added The communication link condition of the above-mentioned coding sound signal which reads the above-mentioned attached information added and recorded on the above-mentioned coding sound signal when reproducing the above-mentioned coding sound signal recorded on the above-mentioned Records Department to the above-mentioned receiver voice, and is reproduced is identified. The control section which adjusts the output level of the above-mentioned receiver voice reproduced according to this discernment result is prepared.

[0011] The control section of the mobile radio telephone concerning invention of the 3rd term of a claim displays on a display the communication link condition of the above-mentioned coding sound signal reproduced by the above-mentioned receiver voice.

[0012] The mobile radio telephone concerning invention of the 4th term of a claim The wireless circuit section to which receives the modulated wave sound signal transmitted from the base station, and it restores to a coding sound signal, The speech processing circuit section which decodes the

above-mentioned coding sound signal to which two or more decode means were established and it restored by the above-mentioned wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal, The attached information generation section which generates the attached information which shows the coding method of the above-mentioned coding sound signal from the encoded information of the above-mentioned modulated wave sound signal transmitted from the above-mentioned base station, When reading the above-mentioned coding sound signal from the Records Department which records the above-mentioned coding sound signal with which the above-mentioned attached information was added and reproducing to a receiver voice The attached information discernment section which reads the above-mentioned attached information added and recorded on the above-mentioned coding sound signal, and identifies the coding method of the above-mentioned coding sound signal, The control section which makes the above-mentioned digitized voice signal decode the above-mentioned coding sound signal recorded on the above-mentioned Records Department by the above-mentioned predetermined decode means according to the coding method identified by this attached information discernment section is prepared.

[0013] The control section of the mobile radio machine concerning invention of the 5th term of a claim chooses a coding sound signal required for the playback to a receiver voice among the above-mentioned coding sound signals, and records it on the above-mentioned Records Department.

[0014]

[Embodiment of the Invention]

Less than [of operation / gestalt .1] and 1 operation gestalt of this invention are explained using drawing 1 thru/or drawing 5 . Drawing 1 is the block block diagram showing the outline configuration of the mobile radio telephone concerning this invention, and drawing 2 is the partial block diagram showing concretely the configuration of the control means shown in drawing 1 . The microphone section in which 1 takes up a user's voice in drawing 1 and drawing 2 , The A/D converter which changes into a digital signal the sound signal of an analog with which 2 was taken up by the microphone section 1, The decryption processing later mentioned while 3 carries out coding processing to the digitized voice signal outputted from A/D converter 2, The speech processing circuit section with the digital signal processing facility which furthermore performs digital signal processing of requests, such as error sign correction, The transmitting-side buffer circuit which adjusts the transmit timing to the base station which 4 memorizes temporarily the coding sound signal encoded by the speech processing circuit section 3, and is not illustrated, 5 is this modulated wave sound signal (it is hereafter called a RF signal.) to the above-mentioned base station which is not illustrated from the antenna section 6 which performed the digital modulation by having made into the modulating signal the coding sound signal inputted through the transmitting-side buffer circuit 4, and was connected electrically. The wireless circuit section with the strange recovery function which carries out the digital recovery of the RF signal (modulated wave receiver signal) which was transmitted from the base station and received by the antenna section 6 while making it transmit at a coding sound signal, While 7 adjusts the timing which memorizes temporarily the coding sound signal by which the digital recovery was carried out, and decodes this coding sound signal to a digitized voice signal by the wireless circuit section 5 The receiving-side buffer circuit which adjusts the timing of record and playback of a coding sound signal among the Records Department which mentions later, respectively, The D/A converter from which 8 changes into the receiver signal of an analog the digitized voice signal decoded by the speech processing circuit section 3 from the coding sound signal, and 9 are the loudspeaker sections which constitute the voice-input/output section with the microphone section 1, and output a receiver voice from the output of D/A converter 9 to the exterior.

[0015] In addition, generally as a digital modulation method of the wireless circuit section 5, $\pi/4$ shift DQPSK ($\pi/4$ shifted differentially encoded quadrature phase shift keying) method is used. As coding mode of processing of the speech processing circuit section 3 A VSELP (Vector-Sum Excited Linear Predictive Coding) method, Data compression coding methods, such as a PSI-CELP (Pitch Synchronous Innovation-Code Excited Linear Prediction) method, are used. If the data encoded by these methods are a VSELP method and they are one-frame every 20ms and a PSI-CELP method,

they will be transmitted, respectively with one-frame the transmission speed in every 40ms.

[0016] Moreover, the control means which performs various motion control of the mobile radio telephone which the internal configuration of 10 is carried out as shown in drawing 2 , and is built over this inventions, such as a quota demand of the line of contact to a base station, The Records Department, such as memory which records the coding sound signal with which the digital recovery of 11 was carried out by the wireless circuit section 5, The control unit which 12 is constituted with ten keys, such as a dialing key, and is directed [playback / of a coding sound signal / record, playback, etc.] from the exterior, 13 is a display which displays communication link conditions, such as circuit quality of the coding sound signal reproduced at the time of playback of the coding sound signal which displayed a partner's telephone number at the time of the call origination of a dial signal, or was recorded. What carries out character representation of the contents of a display to a display panel may generate a corresponding information sound.

[0017] Moreover, in drawing 2 , 14 consists of a microprocessor (henceforth CPU), ROM, RAM, etc. the various control programs (a program for example, required because of radio --) with which CPU was memorized by these ROMs or RAM The control section which controls each part by the program required for record and playback of a coding sound signal, or the program about creation of the below-mentioned attached information, The attached information generation section in which 15 creates the attached information control of attached information creation indicates a silent condition to be based on the owner sound or the silent information which was made and was detected by the control section 14 from the speech processing circuit section 3 by the control section 14, 16 is a part which creates the recording information recorded on the Records Department, and is transposed to the attached information which shows the silent condition of having created the silent signal section by the attached information generation section 15 among the coding sound signals in which the digital recovery was carried out by the wireless circuit section 5. And the recording information creation separation section with the function to divide into the coding sound signal and attached information on an owner sound the recording information read from the Records Department 11 at the time of playback of recording information, 17 writes the recording information created in the recording information creation separation section 16 with the directions from a control section 14 in the Records Department 11. And the recording information write-in read-out section which is recorded on the Records Department 11 by directions of a control section 14 at the time of playback of recording information, and reads **, 18 is the attached information discernment section which identifies the silent condition of the coding sound signal which it was read by the recording information write-in read-out section 17, and the attached information separated from the corresponding coding sound signal, respectively was inputted, added this attached information, and was recorded on the Records Department 11.

[0018] Next, actuation is explained to a detail using drawing 3 thru/or drawing 5 . The case where record actuation of the mobile radio telephone 19 which are the flow chart Fig. showing record actuation of the mobile radio telephone 19 which drawing 3 requires for this invention shown in drawing 1 , and the flow chart Fig. in which drawing 4 shows playback actuation of the contents of record of the mobile radio telephone 19, and is first built over this operation gestalt, especially a message partner's contents of a message are recorded is explained using drawing 3 . in addition, about the message actuation at the time of the message of the mobile radio telephone 19 The sound signal which the user uttered first by the transmitting system is taken up by the microphone section 1. It is transmitted after that in order of A/D converter 2, the speech processing circuit section 3, the transmitting-side buffer circuit 4, the wireless circuit section 5, and the antenna section 6. After the sound signal of the message partner who was transmitted to the message partner through the base station which is not illustrated, and was transmitted through the base station contrary to [in a receiving system] this was received by the antenna section 6 of the mobile radio telephone 19, It is transmitted in order of the wireless circuit section 5, the receiving-side buffer circuit 7, the speech processing circuit section 3, and D/A converter 8, and is carried out by being outputted to the user of the mobile radio telephone 19 from the loudspeaker section 9. And this message actuation is continued in the above way until a communication link is completed with message termination directions.

[0019] When the user of the mobile radio telephone 19 records a message partner's contents of a

message on the Records Department 11 in the above talk states, the user of the mobile radio telephone 19 performs first the key input which chooses a recording mode to a control unit 12 by step 1a. A control unit 12 will output an actuation signal and the record indication signal which directs record actuation here to a control section 14, if the key input which chooses a recording mode is performed. A control section 14 performs record actuation after reading the record control program memorized to ROM or RAM which was prepared in the interior by the record indication signal from this control unit 12 in addition to message actuation.

[0020] If a record control program is performed by the control section 14, the speech processing circuit section 3 will first judge the owner sound or silent condition of a coding sound signal in which the digital recovery was carried out by the wireless circuit section 5 by step 2a from a digitized voice signal. The judgment of how many silent conditions are continuing in the speech processing circuit section 3 not only judges the owner sound condition or silent condition of a coding sound signal decrypted by the digitized voice signal, but also carries out. And the control section 14 which detected the owner sound and silent information judged by the speech processing circuit section 3 distinguishes the silent section of the coding sound signal recorded on the Records Department 11 by step 3a. Here, although the coding sound signal distinguished from the owner sound section is transmitted to the recording information creation separation section 16 as it is, the coding sound signal distinguished as it is the silent section is not transmitted to the recording information creation separation section 16 as it is, but that silent information is first sent to the attached information generation section 15 from a control section 14, and the attached information which shows a silent condition by step 4a by this attached information generation section 15 is created. And the attached information which shows this silent condition is sent to the recording information creation separation section 16, and the recording information creation separation section 16 creates recording information from this attached information and the coding sound signal of an owner sound. That is, since the record permissible dose of the signal of an owner sound will be reduced when the silent signal section is long if a silent coding sound signal is recorded on the Records Department 11 as it is, the coding sound signal of this section judged that is silent is transposed to the signal with a comparatively short data length which shows that silent condition, and it records on the Records Department 11. And in the recording information creation separation section 16, after the recording information created as shown in drawing 5 is outputted to the recording information write-in read-out section 17, it is recorded on the Records Department 11 by the recording information write-in read-out section 17 to which it wrote by the control section 14, and timing was adjusted.

[0021] In addition, drawing 5 is the example of the recording information which was created by the recording information creation separation section 16, and was recorded on the Records Department 11, and is the data block diagram showing the data configuration of recording information. The recording information which transposed the coding sound signal 20 of n frames (n is one or more integers.) and the coded data of the 4-9th frame to the attached information 21 is recorded on the Records Department 11. Moreover, although the attached information 20 is created and replaced for every coded data of an one-frame unit in drawing 5, it is good also as a data configuration which replaces several frames collectively.

[0022] Moreover, the above-mentioned attached information created by the attached information generation section 15 is created by the combination of 0 and 1 data, and can be replaced with a silent coding sound signal with several [only] bits data.

[0023] In addition, step 6a is a step to which a control section 14 supervises the amount of data which the recording information write-in read-out section 17 recorded on the Records Department 11, and if the amount of data beyond a predetermined value is recorded on the Records Department 11 by the Records Department 11, a control section 14 will end record actuation compulsorily. Moreover, if a control section 14 is the step which supervises the record termination signal from a control unit 12, step 7a performs the key input as which the user of the mobile radio telephone 19 chooses record termination mode by the control unit 12 and a record termination signal is inputted from a control unit 12 to a control section 14, a control section 14 will end record actuation compulsorily like step 6a. As mentioned above, according to the mobile radio telephone of this invention concerning this operation gestalt When the contents of a message about which the message

partner spoke are recorded on the Records Department 11 and the silent section continues for a long time among the received coding sound signals, Since the attached information which replaces with the silent coding sound signal, and shows the silent condition was recorded on the Records Department 11, the capacity on which the silent signal in the Records Department 11 is recorded can be reduced, and the coding sound signal of an owner sound can be recorded on the long duration Records Department 11.

[0024] Next, playback actuation is explained using drawing 4 . When the user of the mobile radio telephone 19 concerning this operation gestalt checks the contents of a message recorded on the Records Department 11 in the way shown in drawing 3 , a user performs first the key input which chooses a playback mode to a control unit 12 by step 1b. If the key input which chooses a playback mode is made, a playback indication signal will output a control unit 12 to a control section 14. A control section 14 performs playback actuation after reading the playback control program memorized with the playback indication signal from this control unit 12 to ROM or RAM prepared in the interior.

[0025] If a playback control program is performed by the control section 14, the recording information write-in read-out section 17 will read recording information from the Records Department 11 with step 2b with directions of a control section 14 first. The recording information read to the recording information write-in read-out section 17 is constituted by the coding sound signal of an owner sound, and silent attached information as it was mentioned above, and the attached information and the coding sound signal of an owner sound which show a non-sound by step 3b by the recording information creation separation section 16 are separated. As for the direction of group information, it is transmitted to the attached information discernment section 18 by the recording information creation separation section 16, and discernment is made [while it dissociated] for that silent condition by this attached information discernment section 18 by step 4b. And in the identified result, after being sent to a control section 14 and being again returned to a silent coding sound signal, it is transmitted to the speech processing circuit section 3 through the receiving-side buffer circuit 7 with the coding sound signal of the owner sound of another side separated by the recording information creation separation section 16, and this speech processing circuit section 3 decrypts these coding sound signal by step 5b. The recording information recorded on the Records Department 11 as mentioned above is decrypted, and is reproduced by the receiver voice through D/A converter 8 and the loudspeaker section 9 after that.

[0026] Moreover, step 6b is a step to which a control section 14 supervises read-out of the recording information of the recording information write-in read-out section 17, and if all recording information is read from the Records Department 11, a control section 14 will end playback actuation compulsorily. Moreover, if a control section 14 is the step which supervises the playback termination signal from a control unit 12, step 7b performs the key input as which the user of the mobile radio telephone 19 chooses playback termination mode by the control unit 12 and a playback termination signal is inputted from a control unit 12 to a control section 14, a control section 14 will end playback actuation compulsorily like step 6a.

[0027] Gestalt .2 of operation, next other operation gestalten of this invention are explained. Although the storage capacity of the silent coding sound signal to the Records Department was reduced and record of the long duration to the Records Department of the coding sound signal of a required owner sound is realized by transposing a silent coding sound signal to attached information with the above-mentioned operation gestalt Since this attached information can show the silent condition of for example, a coding sound signal by several [only] bits data In addition, information, such as circuit quality about the coding sound signal recorded on the Records Department 11, may be created as attached information, it may combine in the case of record of this coding sound signal, and the Records Department 11 may be made to record. If it does in this way, it can combine at the time of playback of the coding sound signal which the same Records Department as a coding sound signal could be made to record information, such as circuit quality, without preparing excessive memory, and recorded it, and the information about the circuit quality of this coding sound signal can be displayed on a display 12.

[0028] Generally, in the case of the migration communication system which sets up the line of contact of wireless, to each terminal which connects with this wireless line of contact, and is

telephoning to the message partner, the base station which assigns a line of contact has transmitted the circuit quality of the line of contact under that message, a false error rate, etc. moreover, such a wireless circuit -- each terminal under message -- a message partner's talk -- when the contents which it is not taken at all into consideration about a communication link condition with these message partner, but it is recorded as it is even if a communication link condition is bad, and were recorded when making it record on the memory which prepared the contents in the interior the bottom are reproduced later, and circuit quality is bad, the contents of record were not able to catch. The mobile radio telephone concerning this operation gestalt creates the attached information which shows the circuit quality of a line of contact in use, a false error rate, etc. When recording the coding sound signal in which the digital recovery was carried out by the wireless circuit section on the Records Department, while decrypting the coding sound signal recorded on the Records Department by adding and recording this attached information at the time of playback The communication link condition of the coding sound signal which corresponds from the attached information added to the decrypted coding sound signal is read, and the output level of the receiver voice reproduced according to the communication link condition is adjusted.

[0029] Drawing 6 is the block block diagram showing the configuration of the mobile radio telephone concerning this operation gestalt, and explains actuation of the mobile radio telephone built over this operation gestalt using drawing 6. In addition, a same-among drawing sign's being the same or a considerable part is shown, and detailed explanation is omitted. Moreover, the control section 14 of the mobile radio telephone concerning this operation gestalt does not make the attached information generation section 15 create attached information based on the owner sound and silent information detected from the speech processing circuit section 3. It has the program of operation which makes the attached information generation section 15 create attached information based on the control signal which shows the communication link condition of the line of contact which received through the wireless circuit section 5 in internal ROM or RAM. When a user does the key input which chooses a recording mode by the control unit 12, actuation which creates the attached information based on the above-mentioned control signal is performed. namely, by the mobile radio telephone concerning this operation gestalt The attached information based on [in a control section 14 / it is not rich and] a control signal to the attached information generation section 15 as which a recording mode is chosen by the control unit 12 is made to create. Next, the attached information created in the attached information generation section 15 is added to the coding sound signal recorded on the Records Department 11 in the recording information creation separation section 16, recording information is created, and, finally the recording information write-in read-out section 17 records this recording information on the Records Department 11 with record timing directions of a control section 14.

[0030] drawing 7 be the data block diagram show the data configuration of the recording information recorded on the Records Department of the mobile radio telephone in this operation gestalt , in drawing 7 , 21 be a message partner contents of a message , and after the speech processing circuit section 3 decode , the coding sound signal output from the loudspeaker section 9 to a user as a receiver voice and 22 be the attached information which be added to this coding sound signal 21 , and be recorded on the Records Department 11 . Although the circuit quality (for example, set a good condition to 1 and a crude condition is set to 3) of the line of contact set up among the mobile radio telephones and message partners concerning this operation gestalt is shown, the information which shows the communication link condition under various messages, such as a false error rate, is sufficient as this attached information. Moreover, although the attached information shown in drawing 7 is added for every coding sound signal of one frame and circuit quality is shown about the coding sound signal in every frame, if several frames are summarized to one block and attached information is created for every block, storage capacity can be reduced further and a deployment of memory can be aimed at.

[0031] And while reading the coding sound signal 21 with which the attached information 22 was added from the Records Department 11 at the time of playback and performing decryption and also digital processing by the speech processing circuit section 3 A control section 14 adjusts the output level of the voice-input/output section based on the communication link condition of the coding sound signal 21 discriminated from this attached information 22 (the receiver voice level indication

signal according to the contents of attached information is outputted from a control section 14 to the voice-input/output section.). It is reproducible to a receiver voice in the condition of being easy to catch also from a message partner's contents of a message recorded in the condition that circuit quality is bad, even if.

[0032] Moreover, in the mobile radio machine concerning the above-mentioned operation gestalt, since the receiver voice which raised the output level of a receiver voice automatically and was reproduced is made to output when it judges that it recorded, for example in the condition that circuit quality is bad, consumption of power also becomes large compared with the case where an output level is low. Moreover, since adjustment of an output level is performed automatically, the user of mobile radio telephone cannot know the right and wrong of the communication link condition of the recorded coding sound signal, and cannot do pinpointing of the location where a communication link condition is bad. In the field of this mobile radio telephone that may also become repeating record in the bad location of a talk state now, and uses battery chargers, such as a rechargeable battery, as a power supply section, and is always carried by the busy condition, it leads to consumption of excessive power and is not so desirable. Then, while adjusting the output level of the receiver voice reproduced at the time of playback of the recorded contents, you may make it display on a display 13 the communication link condition of the coding sound signal discriminated from attached information. In this case, the display of the liquid crystal screen which displays a message partner's number to be dialed etc. as a display means of a display 13 at the time of call origination is sufficient, and an information sound utterance means to utter the information sound according to a communication link condition may be established.

[0033] Gestalt .3 of operation, next other operation gestalten of this invention are explained using drawing 8 thru/or drawing 10 . The mobile radio telephone concerning this operation gestalt is applied to the migration communication system with which two or more coding methods were used together, and it creates attached information which shows each coding method by the mobile radio telephone concerning this operation gestalt in order to realize exact playback according to the coding method of each coding sound signal, when reproducing the coding sound signal recorded on the Records Department. And the coding sound signal which adds this attached information to a corresponding coding sound signal, and the Records Department was made to record, and chose the coding method discriminated from this attached information at the time of playback, and was recorded on the Records Department is made to decrypt.

[0034] Drawing 8 is the block block diagram showing the outline configuration of the mobile radio telephone concerning this operation gestalt, and drawing 9 is the partial block diagram showing the configuration of a control means concretely. In drawing 8 and drawing 9 The coding means 23a and 23b and decryption means 23c of plurality [23], 23d (a method 1 is a VSELP method and a method 2 is a PSI-CELP method) is prepared. The speech processing circuit section as which the coding means and decryption means which are the same coding method as the base station which constitutes the wireless line of contact set up among message partners during the message are chosen, 24 is a common control circuit (it is called CSC below Common SignallingChannel:.) which an internal configuration is carried out as shown in drawing 9 , and is used for assignment of a line of contact at the time of a wireless line-of-contact setup by the base station. With a control signal including the signal which specifies the coding method which minded and was transmitted from the base station The thing of the same coding method as the base station which constitutes the line of contact set up among message partners out of each coding means of the speech processing circuit section 3 and a decryption means is chosen. With moreover, the record indication signal from a control unit 12 The control section which performs a series of motion control which records the coding sound signal in which the digital recovery was carried out by the wireless circuit section 5 on the Records Department 11, The attached information generation section which creates the attached information which shows the coding method of the coding sound signal which records 25 on the Records Department 11 with the directions from a control section 24, 26 adds the attached information generated by the attached information generation section 25 to the coding sound signal recorded on the Records Department 11, and creates recording information. Moreover, the recording information creation separation section which divides into a coding sound signal and attached information the recording information read from the Records Department 11, The recording information write-in

read-out section which reads the recording information recorded on the Records Department 11 by writing or the Records Department 11 in the recording information which created 27 in recording information creation / separation section 26 with the directions from a control section 24, 28 is the attached information discernment section which identifies the coding method of the coding sound signal which it was read by the recording information write-in read-out section 27, and a coding sound signal and the separated attached information were inputted, and was recorded on the Records Department 11 from this attached information. In addition, a same-among drawing sign's being the same or a considerable part is shown, and detailed explanation is omitted.

[0035] Moreover, drawing 11 is the system configuration Fig. showing the migration communication system with which the mobile radio telephone 29 concerning this operation gestalt shown in drawing 8 is used, and the communications area 31 where it connects, respectively and two or more base stations K_n (n is one or more integers.) consist of two or more wireless zones E_n (n is one or more integers.) is formed in the line control office 30 linked to a public line network. Moreover, in drawing 11, a base station K_1 shall adopt a VSELP method, and the base station K_2 shall have adopted the coding method of a PSI-CELP method, respectively. the condition (b points -- a line of contact T_2 -- a message -- a line --) which is moving to the B point of the wireless zone which a base station K_2 forms, the mobile radio telephone's 29 telephoning to a message partner by the line of contact T_1 in the A point of the wireless zone which a base station K_1 forms first, and continuing a message after that It is shown.

[0036] Next, actuation is explained to a detail using drawing 11 thru/or drawing 13. The flow chart Fig. showing record actuation of the mobile radio telephone 29 which drawing 11 requires for this operation gestalt shown in drawing 8, and drawing 12 are the flow chart Figs. showing playback actuation of the recorded contents of record, and record actuation of the mobile radio telephone 29 is first explained using drawing 11. in addition, the condition that the mobile radio telephone 29 shows the flow chart Fig. shown in drawing 11 to drawing 10 -- a message partner's talk -- the actuation in the case of recording the contents of a message on the Records Department 11 the bottom is shown. In an A point, when the user of the mobile radio telephone 29 who is telephoning to the message partner by the line of contact T_1 records a message partner's contents of a message on the Records Department 11, the user performs first the key input which chooses a recording mode to a control unit 12 (step 1c). A control unit 12 will output the record indication signal which directs record actuation to a control section 24, if the key input which chooses a recording mode is performed. A control section 24 will perform record actuation after reading the record control program memorized to ROM or RAM prepared in the interior in addition to message actuation, if the record indication signal from this control unit 12 is inputted.

[0037] A control section 24 will distinguish the coding method of the coding sound signal in which the digital recovery was first carried out by the wireless circuit section 5, if a record control program is performed by selection of a recording mode (step 2c). By the mobile radio telephone 29 concerning this operation gestalt, since distinction of a coding method is performed based on the assignment signal of the coding method contained in the control signal transmitted from a base station through CSC, also when a line of contact changes later, the coding method which the base station which constitutes the wireless line of contact which changed at the time of a setup of the new wireless line of contact uses can be distinguished. And a control section 24 makes the attached information generation section 25 create the attached information according to this distinction result first, adds the attached information which shows this coding method in the recording information creation separation section 26 below to a coding sound signal, makes recording information create, and makes the Records Department 11 write in this recording information by the recording information write-in read-out section 27 finally (step 3c). Moreover, step 4c is a step to which a control section 24 supervises the amount of data which the recording information write-in read-out section 27 recorded on the Records Department 11, and if the amount of data beyond a predetermined value is recorded on the Records Department 11 by the Records Department 11, a control section 24 will end record actuation compulsorily. If a control section 24 is the step which supervises the record termination signal from a control unit 12, step 5c performs the key input as which the user of the mobile radio telephone 29 chooses record termination mode by the control unit 12 and a record termination signal is inputted from a control unit 12 to a control section 24, a control

section 24 will end record actuation compulsorily like step 4c.

[0038] Moreover, step 6c is a step which supervises the change rate of a wireless line of contact, and when the wireless line of contact T1 set up among message partners changes to the wireless line of contact T2 by migration of the mobile radio telephone 29, a control section 24 distinguishes the coding method which the base station K2 which constitutes the wireless line of contact T2 which changed to step 2c based on return and the control signal again transmitted from the base station K2 through CSC uses. If the wireless line of contact T1 does not change, step 3c thru/or 5c are continued as it is till record termination. In addition, although the radio circuit between the mobile radio telephone 29 in the location of c points of drawing 10 and a message partner is set to either T1 or T2 and being dealt in it The line control station 30 (network side) to which each base station was connected Usually, the channel busy condition of each base station, For example, the traffic condition is supervised, and although it should connect with which wireless line of contact by decision by the side of this network, it is directed to the mobile radio telephone 29 through a base station K1 or a base station K2. These directions are performed by the above-mentioned control signal through CSC. Moreover, each base station may detect the radio field intensity of the transmission signal transmitted to each base station K1 or K2 from the mobile radio telephone 29, and you may point so that it may connect with the radio circuit in the direction of the strong base station of this radio field intensity. Drawing 13 is the data block diagram showing the data configuration of the recording information recorded on the Records Department 11 as mentioned above.

[0039] In drawing 13 , the coding sound signal of n frames (n is one or more integers.) with which 32 was recorded in distinction from the Records Department 11 the whole frame, and 33 are the attached information added to the coding sound signal 32. V shows a VSELP method among drawing 13 , and P shows a PSI-CELP method. The attached information 33 which shows a coding method as shown in drawing 12 is added for every coding sound signal of one frame, respectively.

[0040] Moreover, drawing 14 is the data block diagram showing other data configurations of the recording information recorded on the Records Department 11. Although attached information is added to the coding sound signal of each frame which is created for every frame and corresponds in drawing 13 When a coding method changes as a result of discernment of the coding method by the control section 24, That is, when a wireless line of contact changes to the line of contact of a base station which uses other coding methods, attached information may be made to add only to the coding sound signal of the frame of the head (as shown in drawing 10 , when for the location of the mobile radio telephone 29 to move to c points from a points). In addition, among drawing 13 , K shows a coding method, and when this coding method K changes to K+1, it adds the attached information P corresponding to that coding method.

[0041] Next, playback actuation is explained using drawing 12 . When the user of the mobile radio telephone 29 concerning this operation gestalt checks the contents of a message recorded on the Records Department 11 in the way shown in drawing 11 , a user performs first the key input which chooses a playback mode to a control unit 12 (step 1d). A control unit 12 will output a playback indication signal to a control section 24, if the key input which chooses a playback mode is made. A control section 24 performs playback actuation after reading the playback control program memorized with the playback indication signal from this control unit 12 to ROM or RAM prepared in the interior.

[0042] If a playback control program is performed by the control section 24, the recording information write-in read-out section 27 will read first recording information shown in drawing 13 from the Records Department 11 with directions of a control section 24. Next, the read recording information is divided into the coding sound signal 32 of the coding method shown in the attached information 33 which shows a coding method by the recording information creation separation section 26, and this attached information 33. Although decrypted by the digitized voice signal with a decryption means by which the coding sound signal 32 was transmitted to the speech processing circuit section 3 through the receiving-side buffer circuit 7, and the after-mentioned was chosen for while it dissociated, selection of this decryption means is performed based on discernment of the attached information on the attached information discernment section 28. That is, this attached information discernment section 28 discriminates a coding method from the attached information 33

on another side separated by the recording information creation separation section 26, according to this discernment result, while was separated and a control section 24 chooses the decryption means corresponding to the coding method of a coding sound signal (step 2d). Selection of a decryption means is performed when a control section 24 outputs a coding method selection signal to the speech processing circuit section 3. And while was separated by the recording information creation separation section 26, and the coding sound signal 32 is decrypted by the digitized voice signal with the decryption means chosen by the control section 24 (if it says by drawing 13, code data 1 and 2 will be decrypted by the VSELP method, and coded data n will be decrypted by the PSI-CELP method.). The digitized voice signal decrypted by this selected decryption means is reproduced by the receiver voice through D/A converter 8 and the loudspeaker section 9 after that (step 3d).

[0043] Moreover, step 4d is a step to which a control section 24 supervises read-out of the recording information of the recording information write-in read-out section 27, and if all recording information is read from the Records Department 11, a control section 24 will end playback actuation compulsorily. Moreover, step 5d, a control section 24 is the step which supervises the playback termination signal from a control unit 12, and if the user of the mobile radio telephone 29 concerning this operation gestalt performs the key input which chooses playback termination mode by the control unit 12 and a playback termination signal is inputted from a control unit 12 to a control section 24, a control section 24 will end playback actuation compulsorily like step 4d.

[0044] Although the mobile radio telephone concerning gestalt .5 and the above-mentioned operation gestalt of operation recorded all the coding sound signals in which the digital recovery was carried out by the wireless circuit section 5 on the Records Department 11 In case it records on the Records Department, only the data of this first class are chosen and you may make it record on the Records Department 11 in distinction from data (first class) required for a decryption, and the other data (B class: thing about tone quality etc.) (memory saving mode). For example, in case a user performs record directions from a control unit 12, it enables it to choose memory saving mode collectively. Although the receiver voice at the time of playback will deteriorate somewhat if it does in this way, the storage capacity of the coding sound signal recorded on the Records Department 11 can be reduced, and the Records Department 11 can be made to record the coding sound signal for a long time further.

[0045] Drawing 15 is the data block diagram showing the data configuration of the recording information recorded on the Records Department 11 of the mobile radio telephone concerning this operation gestalt, and the recording information by which 34 was usually sometimes recorded, and 35 show the recording information recorded on the Records Department 11, respectively, when memory saving mode is chosen by the control unit 12. As shown in drawing 15, when memory saving mode is chosen, only the coded data of a first class is recorded on the Records Department 11.

[0046]

[Effect of the Invention] As mentioned above, the wireless circuit section to which according to invention of the 1st term of a claim receives the modulated wave sound signal transmitted from the base station, and it restores to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which it restored by this wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal decoded by this speech processing circuit section, The above-mentioned digitized voice signal is detected with the attached information generation section which generates the attached information which shows the silent condition of the above-mentioned coding sound signal recorded on the above-mentioned Records Department according to the owner sound or silent condition of the above-mentioned digitized voice signal decoded by the Records Department where the above-mentioned coding sound signal is recorded, and the above-mentioned speech processing circuit section. Since the control section which replaces with the coding sound signal of the above-mentioned non-sound the above-mentioned attached information generated by the above-mentioned attached information generation section, and is recorded on the above-mentioned Records Department was prepared when the above-mentioned coding sound signal recorded on the above-mentioned Records Department was in a silent condition Since it is transposed to the attached

information which shows a non-sound, and is recorded on the Records Department and only the coding sound signal of an owner sound is recorded on the Records Department as it is, the received silent coding sound signal can reduce the storage capacity to the Records Department of a silent coding sound signal, and can record the coding sound signal of an owner sound on the Records Department for a long time.

[0047] Moreover, the wireless circuit section which restores to the modulated wave sound signal from the base station received through the line of contact to a coding sound signal according to invention of the 2nd term of a claim, The speech processing circuit section which decodes the above-mentioned coding sound signal to which it restored by this wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal decoded by this speech processing circuit section, The attached information generation section which generates the attached information which shows the communication link condition of the above-mentioned modulated wave sound signal using the circuit information on the above-mentioned line of contact transmitted from the above-mentioned base station, With the Records Department which records the above-mentioned coding sound signal with which the above-mentioned attached information generated by this attached information generation section was added The communication link condition of the above-mentioned coding sound signal which reads the above-mentioned attached information added and recorded on the above-mentioned coding sound signal when reproducing the above-mentioned coding sound signal recorded on the above-mentioned Records Department to the above-mentioned receiver voice, and is reproduced is identified. Since the control section which adjusts the output level of the above-mentioned receiver voice reproduced according to this discernment result was prepared While the prolonged contents of a message are recordable on the Records Department, corresponding to the circuit quality of the coding sound signal recorded at the time of playback of recording information, a false error rate, etc., the output level of a receiver voice can be adjusted to the Records Department.

[0048] Moreover, since the above-mentioned control section displays on a display the communication link condition of the above-mentioned coding sound signal reproduced by the above-mentioned receiver voice according to invention of the 3rd term of a claim, the circuit quality of the coding sound signal recorded at the time of playback of recording information, a false error rate, etc. are displayed or reported to a user, and the communication link condition of the recorded location can be recognized.

[0049] Moreover, the wireless circuit section to which according to invention of the 4th term of a claim receives the modulated wave sound signal transmitted from the base station, and it restores to a coding sound signal, The speech processing circuit section which decodes the above-mentioned coding sound signal to which two or more decode means were established and it restored by the above-mentioned wireless circuit section to a digitized voice signal, The voice-input/output section which outputs the receiver voice corresponding to the above-mentioned modulated wave sound signal from the above-mentioned digitized voice signal, The attached information generation section which generates the attached information which shows the coding method of the above-mentioned coding sound signal from the encoded information of the above-mentioned modulated wave sound signal transmitted from the above-mentioned base station, When reading the above-mentioned coding sound signal from the Records Department which records the above-mentioned coding sound signal with which the above-mentioned attached information was added and reproducing to a receiver voice The attached information discernment section which reads the above-mentioned attached information added and recorded on the above-mentioned coding sound signal, and identifies the coding method of the above-mentioned coding sound signal, Since the control section which makes the above-mentioned digitized voice signal decode the above-mentioned coding sound signal recorded on the above-mentioned Records Department by the above-mentioned predetermined decode means according to the coding method identified by this attached information discernment section was prepared Playback which each coding sound signal was decrypted with the decryption means corresponding to the coding method, and the contents of record followed also when a communication line recorded two or more kinds of coding sound signals which changed to the circuit of other base stations and were encoded by different coding method while recording the

contents of a message can be performed. The Records Department can do record of the coding sound signal of long duration.

[0050] Moreover, since according to invention of the 5th term of a claim the above-mentioned control section chooses a coding sound signal required for the playback to a receiver voice among the above-mentioned coding sound signals and records it on the above-mentioned Records Department, the storage capacity of the coding sound signal recorded on the Records Department can be reduced further, and the Records Department 11 can be made to record the coding sound signal for a long time.

[Translation done.]

*** NOTICES ***

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- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block block diagram showing the mobile radio telephone by 1 operation gestalt of this invention.

[Drawing 2] It is the block block diagram showing the control means of the mobile radio telephone shown in drawing 1 .

[Drawing 3] It is the flow chart Fig. showing record actuation of the mobile radio telephone shown in drawing 1 and drawing 2 .

[Drawing 4] It is the flow chart Fig. showing playback actuation of the mobile radio telephone shown in drawing 1 and drawing 2 .

[Drawing 5] It is the data block diagram of the recording information recorded on the Records Department of the mobile radio telephone shown in drawing 1 and drawing 2 .

[Drawing 6] It is the block block diagram showing the control means of the mobile radio telephone by operation gestalt .2 of this invention.

[Drawing 7] It is the data block diagram of the recording information recorded on the Records Department of the mobile radio telephone shown in drawing 6 .

[Drawing 8] It is the block block diagram showing the mobile radio telephone by gestalt .3 of implementation of this invention.

[Drawing 9] It is the block block diagram showing the control means of the mobile radio telephone shown in drawing 8 .

[Drawing 10] It is the system configuration Fig. showing the migration communication system with which the mobile radio telephone shown in drawing 8 and drawing 9 is applied.

[Drawing 11] It is the flow chart Fig. showing record actuation of the mobile radio telephone shown in drawing 8 and drawing 9 .

[Drawing 12] It is the flow chart Fig. showing playback actuation of the mobile radio telephone shown in drawing 8 and drawing 9 .

[Drawing 13] It is the data block diagram of the recording information recorded on the Records Department of the mobile radio telephone shown in drawing 8 and drawing 9 .

[Drawing 14] They are other data block diagrams of the recording information recorded on the Records Department of the mobile radio telephone shown in drawing 8 and drawing 9 .

[Drawing 15] It is the data block diagram of the recording information recorded on the Records Department of the mobile radio machine applied to this invention at the time of memory saving mode selection.

[Description of Notations]

3 23 Speech processing circuit section

5 Wireless Circuit Section

9 Loudspeaker Section

10 Control Means

11 Records Department

12 Control Unit

13 Display

14 24 Control section

15 25 Attached information generation section

18 28 Attached information discernment section

[Translation done.]

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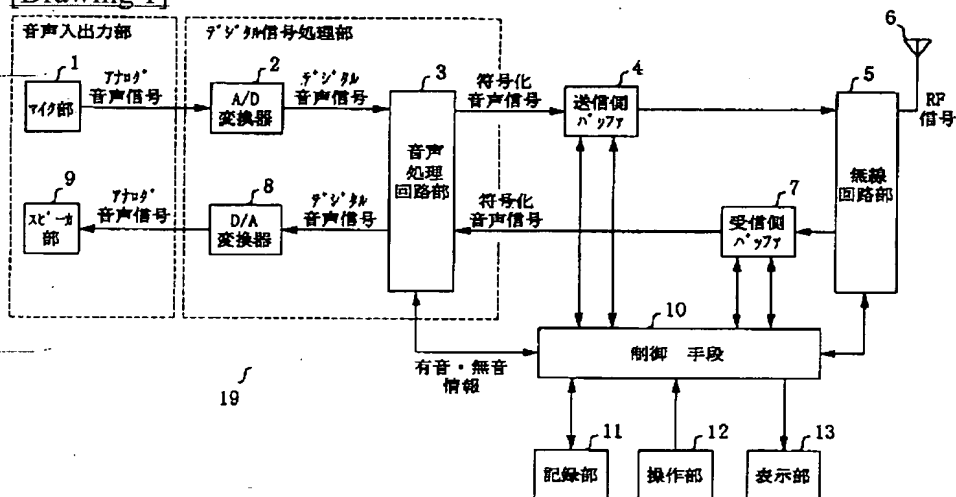
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2. **** shows the word which can not be translated.

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DRAWINGS

[Drawing 1]



[Drawing 7]

付属情報 (回線品質) 符号化音声信号

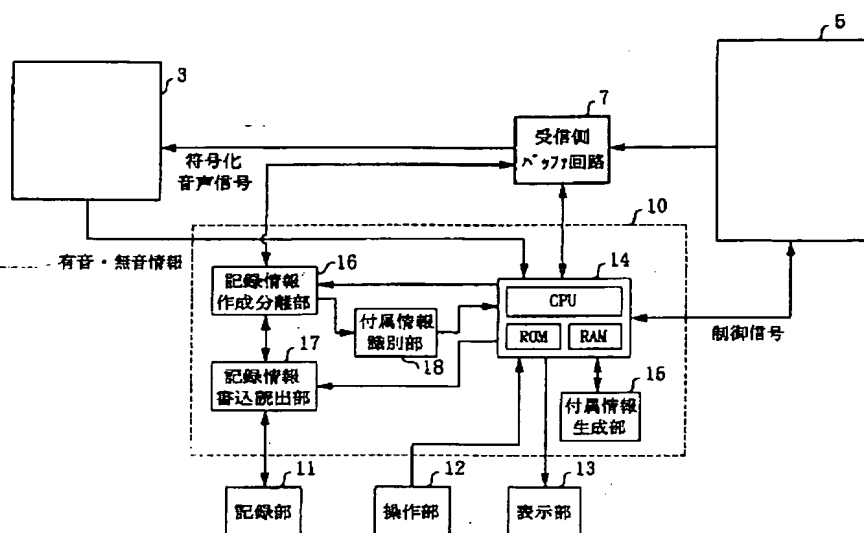
3	フレーム1のデータ	21
2	2	
2	3	
1	4	
⋮	⋮	

[Drawing 13]

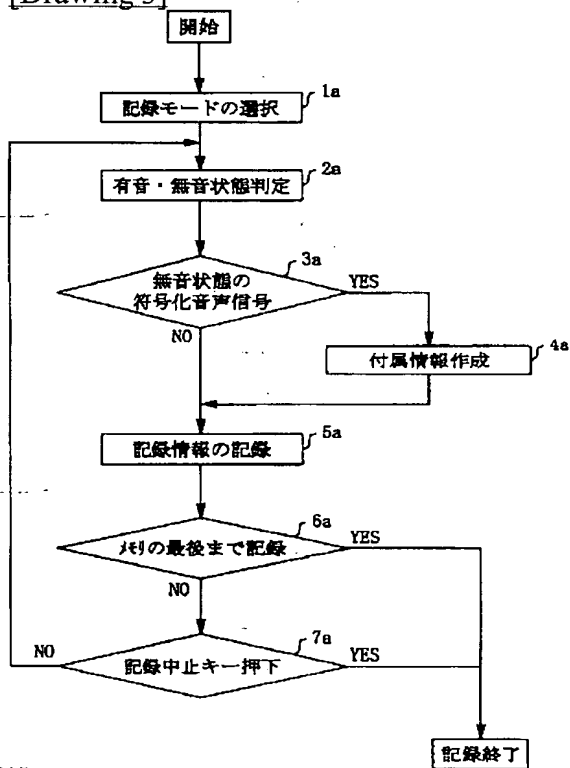
付属情報 符号化音声信号

付属情報V	符号化データ1	32
付属情報V	符号化データ2	
⋮	⋮	
付属情報P	符号化データn	

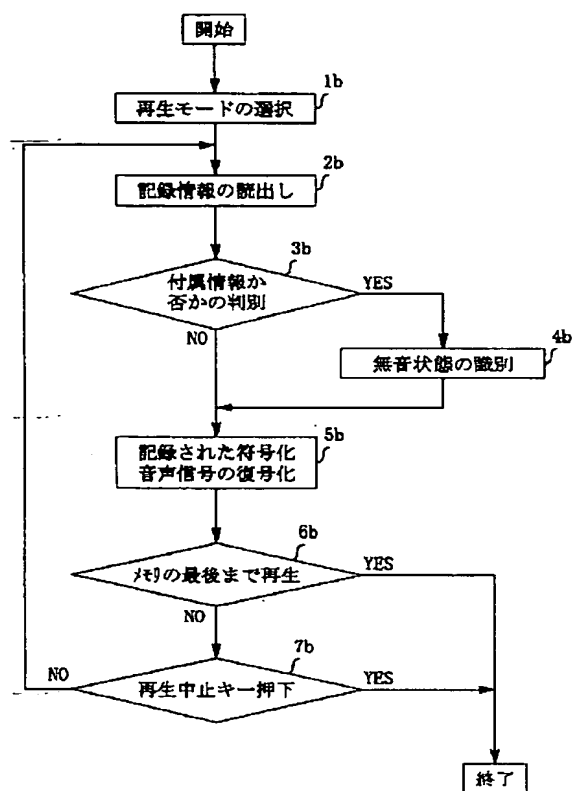
[Drawing 2]



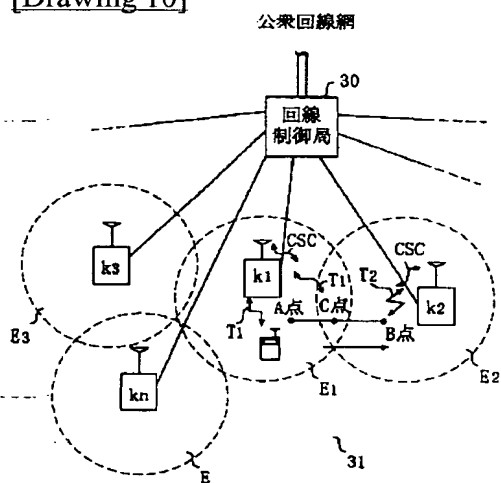
[Drawing 3]



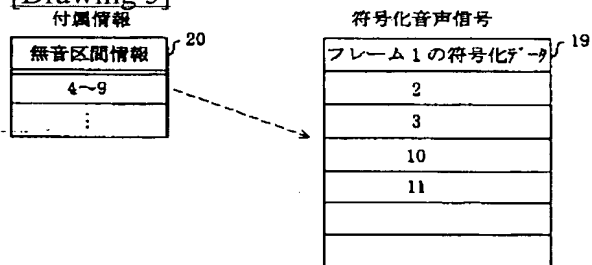
[Drawing 4]



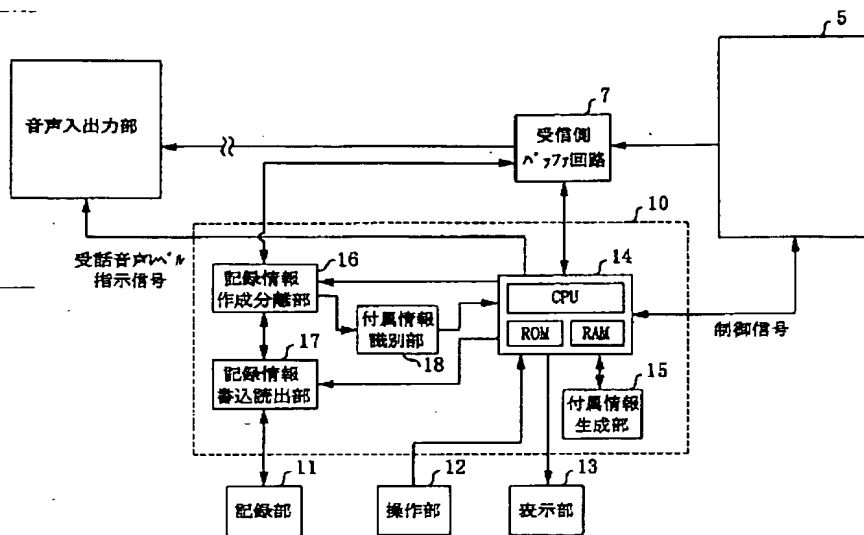
[Drawing 10]



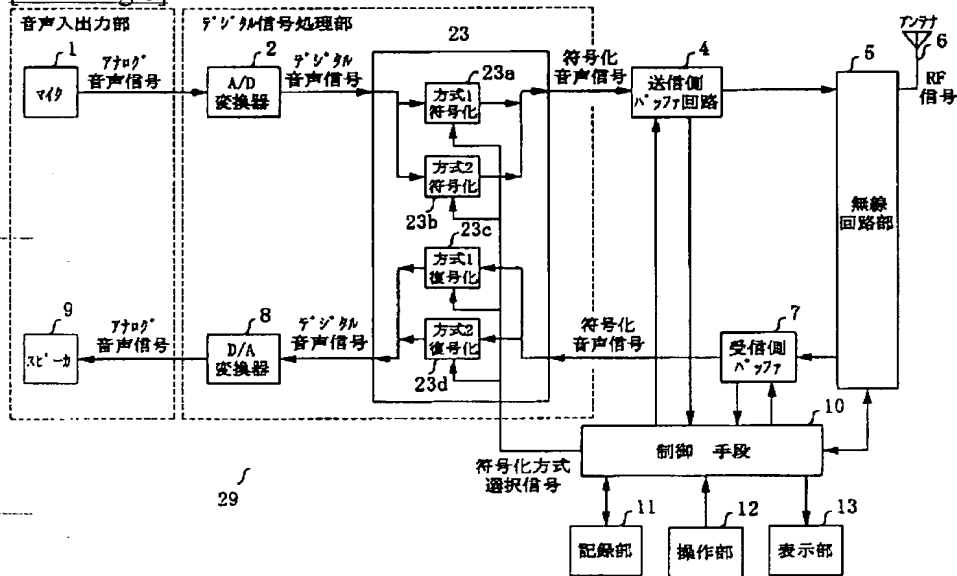
[Drawing 5]



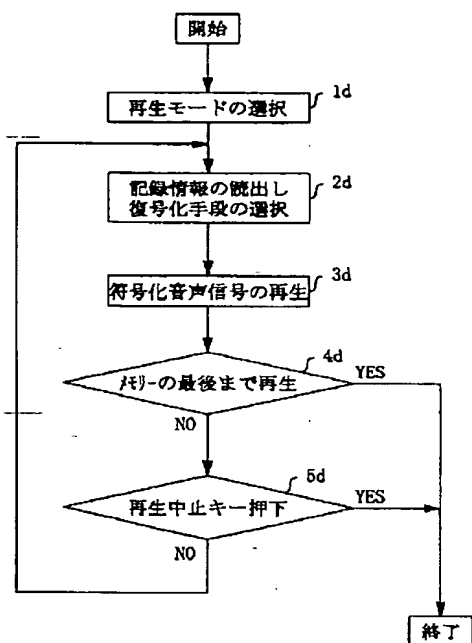
[Drawing 6]



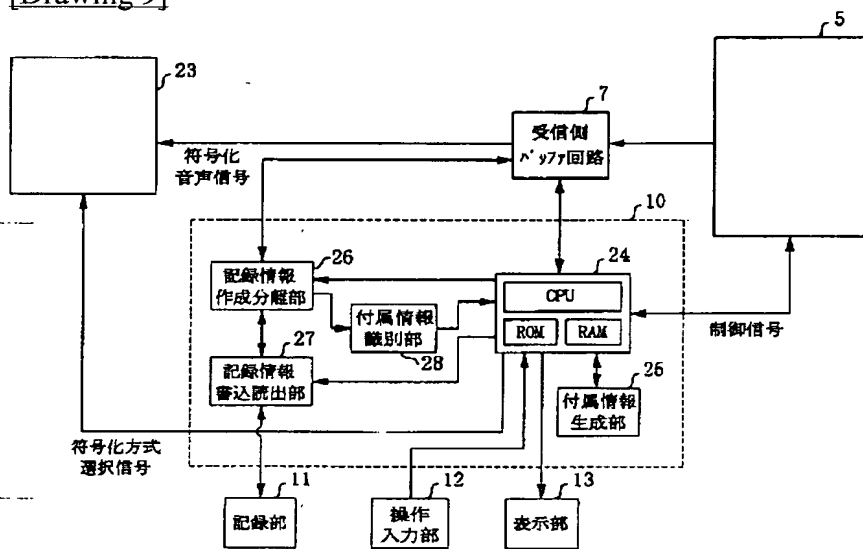
[Drawing 8]



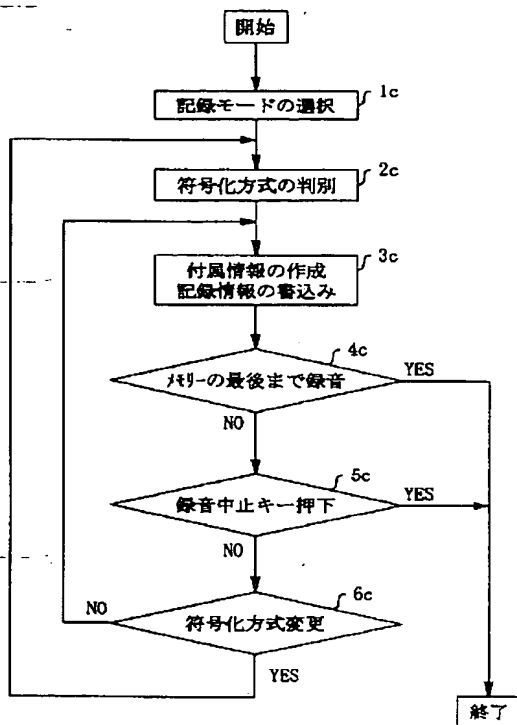
[Drawing 12]



[Drawing 9]



[Drawing 11]



[Drawing 14]

符号化音声信号

符号化データ1
⋮
符号化データk
符号化データk+1
⋮
符号化データm

付属情報

付属情報V
⋮
付属情報P
⋮
付属情報

[Drawing 15]

通常モード選択時

⇔ メモリ節約モード選択時

フレーム1のクラスAビット	
1	B
2	A
2	B
3	A
3	B
⋮	

フレーム1のクラスAビット	
2	A
3	A
⋮	

[Translation done.]

(2)

1

【特許請求の範囲】

【請求項1】 基地局から送信された被変調波音声信号を受信して符号化音声信号に復調する無線回路部と、この無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、この音声処理回路部により復号された上記デジタル音声信号から上記被変調波音声信号に対応する受話音声出力する音声入出力部と、上記符号化音声信号が記録される記録部と、上記音声処理回路部により復号された上記デジタル音声信号の有音又は無音状態に応じて上記記録部に記録する上記符号化音声信号の無音状態を示す付属情報を生成する付属情報生成部と、上記デジタル音声信号を検出し、上記記録部に記録する上記符号化音声信号が無音状態のときには上記付属情報生成部により生成した上記付属情報を上記無音の符号化音声信号に代えて上記記録部に記録する制御部とを備えたことを特徴とする移動無線電話機。

【請求項2】 通話回線を介して受信した基地局からの被変調波音声信号を符号化音声信号に復調する無線回路部と、この無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、この音声処理回路部により復号された上記デジタル音声信号から上記被変調波音声信号に対応する受話音声出力する音声入出力部と、上記基地局から送信された上記通話回線の回線情報により上記被変調波音声信号の通信状態を示す付属情報を生成する付属情報生成部と、この付属情報生成部により生成された上記付属情報が付加された上記符号化音声信号を記録する記録部と、上記記録部に記録された上記符号化音声信号を上記受話音声へ再生するときに上記符号化音声信号に付加して記録された上記付属情報を読み出して再生される上記符号化音声信号の通信状態を識別し、この識別結果に応じて再生された上記受話音声の出力レベルを調整する制御部とを備えたことを特徴とする移動無線電話機。

【請求項3】 上記制御部は上記受話音声に再生された上記符号化音声信号の通信状態を表示部に表示させることを特徴とする請求項第2項に記載の移動無線電話機。

【請求項4】 基地局から送信された被変調波音声信号を受信して符号化音声信号に復調する無線回路部と、複数の復号手段が設けられ、上記無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、上記デジタル音声信号から上記被変調波音声信号に対応する受話音声出力する音声入出力部と、上記基地局から送信された上記被変調波音声信号の符号化情報から上記符号化音声信号の符号化方式を示す付属情報を生成する付属情報生成部と、上記付属情報が付加された上記符号化音声信号を記録する記録部から上記符号化音声信号を読み出して受話音声に再生するときに、上記符号化音声信号に付加して記録された上記付属情報を読み出して上記符号化音声信号の符号化方式を

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識別する付属情報識別部と、この付属情報識別部により識別された符号化方式に応じた所定の上記復号手段によって上記記録部に記録された上記符号化音声信号を上記デジタル音声信号に復号させる制御部とを備えたことを特徴とする移動無線電話機。

【請求項5】 上記制御部は上記符号化音声信号の内、受話音声への再生に必要な符号化音声信号を選択して上記記録部に記録することを特徴とする請求項第1項、第2項又は第4項に記載の移動無線電話機。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、デジタル方式の無線電話機に関し、通話相手から送信された音声信号を長時間記録部に記録させる手段を有する移動無線電話機に関する。

【0002】

【従来の技術】近年、デジタル方式を採用した移動無線通信システムが提唱され、自動車電話、携帯電話及びPHS (Personal Handy Phone System) 等多数の分野で使用されている。また、デジタル方式を採用した移動無線システムでは、小容量のメモリに長時間分の通話内容を記録する手段として符号化したデジタル音声信号をそのままメモリに記録することが一般に行われている。

【0003】例えば、特開平7-143223号公報には、既存の音声符合復号手段を設け、通話の状態ではこの音声符合復号手段によって符号化されたデジタル音声信号を復号し、モード指定手段により記録モードが指定された状態では符号化されたデジタル音声信号を復号せず、そのまま記憶手段に記憶させることにより小容量のメモリに長時間分の音声信号を記憶させることが記載されている。

【0004】

【発明が解決しようとする課題】従来の移動無線電話機は、以上のように構成されており、記憶モードが指定された場合には、たとえ記憶する符号化音声信号が無音の状態であったとしても何ら処理がほどこされずそのまま記録部に記憶され、無音状態の信号区間が長時間継続した場合には音声信号を有する有音状態の符号化音声信号をほとんど記憶することができなかった。

【0005】また、このような移動無線電話機は単一の符号化方式を用いた移動通信システムに適用されるものであり、複数の符号化方式が混在し、これら各符号化方式により符号化された音声信号によって通話を行うシステムにおいては（一般にこれら移動無線システムの符号化方式は単一の方式に構成される（例えば、伝送速度が20ms/フレームとする。）が、これら既存のシステムの伝送効率をさらに上げる場合（例えば、40ms/フレームにする）には、種々の事情から全ての基地局をいっぺんに40ms/フレームの圧縮方式を持つ基地局

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に交換するのではなく、数分ずつ20ms/フレームの基地局と交換していくため(1つのシステムで複数の符号化方式が一定期間混在することになる。)、単一の符号化方式にしか使用できない従来の移動無線電話機では各符号化方式に対応することができなかった。例えば、符号化方式1を使用した基地局の無線ゾーン内を移動しながら通話内容を記憶する場合、その途中で符号化方式2を使用した基地局の無線ゾーン内に移動したときにはメモリに記憶された音声信号は途中で符号化方式が異なっており、このように記憶された通話内容はたとえ受話音声に再生しようとしても復号化手段が対応せず、符号化方式が対応する一部分の記憶内容しか受話音声に再生できなかった。

【0006】また、これら移動無線電話機の分野では、長時間の通話内容を小容量のメモリに記憶できることは、小型化・軽量化の観点からもきわめて有益である。

【0007】この発明は、かかる課題を解決するためになされたものであり、符号化された音声信号をメモリに記録する場合において、符号化音声信号が無音状態のときにはこの符号化音声信号に代えて無音状態を示す付属情報をメモリに記憶することによりメモリ内の無音の符号化音声信号が記憶される容量を削減し、有音の符号化音声信号を長時間記憶できる新規な移動無線電話機を提供することを目的とする。

【0008】また、メモリ内に長時間分の符号化音声信号が記憶できると共に、記憶した符号化音声信号を受話音声へ再生するときにこの符号化音声信号の回線品質、疑似誤り率等の通信状態に応じた出力レベルによる受話音声の出力又は上記通信状態の使用者に知らせることができる新規な移動無線電話機をも提供する。また、

【0009】

【課題を解決するための手段】請求項第1項の発明に係る移動無線電話機は、基地局から送信された被変調波音声信号を受信して符号化音声信号に復調する無線回路部と、この無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、この音声処理回路部により復号された上記デジタル音声信号から上記被変調波音声信号に対応する受話音声出力する音声入出力部と、上記符号化音声信号が記録される記録部と、上記音声処理回路部により復号された上記デジタル音声信号の有音又は無音状態に応じて上記記録部に記録する上記符号化音声信号の無音状態を示す付属情報を生成する付属情報生成部と、上記デジタル音声信号を検出し、上記記録部に記録する上記符号化音声信号が無音状態のときには上記付属情報生成部により生成した上記付属情報を上記無音の符号化音声信号に代えて上記記録部に記録する制御部とを設けたものである。

【0010】請求項第2項の発明に係る移動無線機は、通話回線を介して受信した基地局からの被変調波音声信号を符号化音声信号に復調する無線回路部と、この無線

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回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、この音声処理回路部により復号された上記デジタル音声信号から上記被変調波音声信号に対応する受話音声出力する音声入出力部と、上記基地局から送信された上記通話回線の回線情報により上記被変調波音声信号の通信状態を示す付属情報を生成する付属情報生成部と、この付属情報生成部により生成された上記付属情報が付加された上記符号化音声信号を記録する記録部と、上記記録部に記録された上記符号化音声信号を上記受話音声へ再生するときに上記符号化音声信号に付加して記録された上記付属情報を読み出して再生される上記符号化音声信号の通信状態を識別し、この識別結果に応じて再生された上記受話音声の出力レベルを調整する制御部とを設けたものである。

【0011】請求項第3項の発明に係る移動無線電話機の制御部は、上記受話音声に再生された上記符号化音声信号の通信状態を表示部に表示させるものである。

【0012】請求項第4項の発明に係る移動無線電話機は、基地局から送信された被変調波音声信号を受信して符号化音声信号に復調する無線回路部と、複数の復号手段が設けられ、上記無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、上記デジタル音声信号から上記被変調波音声信号に対応する受話音声出力する音声入出力部と、上記基地局から送信された上記被変調波音声信号の符号化情報から上記符号化音声信号の符号化方式を示す付属情報を生成する付属情報生成部と、上記付属情報が付加された上記符号化音声信号を記録する記録部から上記符号化音声信号を読み出して受話音声に再生するときに、上記符号化音声信号に付加して記録された上記付属情報を読み出して上記符号化音声信号の符号化方式を識別する付属情報識別部と、この付属情報識別部により識別された符号化方式に応じた所定の上記復号手段によって上記記録部に記録された上記符号化音声信号を上記デジタル音声信号に復号させる制御部とを設けたものである。

【0013】請求項第5項の発明に係る移動無線機の制御部は、上記符号化音声信号の内、受話音声への再生に必要な符号化音声信号を選択して上記記録部に記録するものである。

【0014】

【発明の実施の形態】

実施の形態 1

以下、この発明の一実施形態を図1乃至図5を用いて説明する。図1はこの発明に係る移動無線電話機の概略構成を示すブロック構成図であり、図2は図1に示す制御手段の構成を具体的に示す部分構成図である。図1及び図2において、1は使用者の音声ピックアップするマイク部、2はマイク部1によりピックアップされたアナログの音声信号をデジタル信号に変換するA/D変換器、3はA/D変換器2から出力されたデジタル音声信号

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号に符号化処理を行うと共に後述する復号化処理、さらに誤り符号訂正などの所望のデジタル信号処理を施すデジタル信号処理機能を有した音声処理回路部、4は音声処理回路部3によって符号化された符号化音声信号を一時的に記憶して図示しない基地局への送信タイミングを調整する送信側バッファ回路、5は送信側バッファ回路4を介して入力された符号化音声信号を変調信号としてデジタル変調を行い、電氣的に接続されたアンテナ部6から図示しない上記基地局に対しこの被変調波音声信号（以下、RF信号という。）を送信させると共に、基地局から送信され、アンテナ部6により受信したRF信号（被変調波受話信号）を符号化音声信号にデジタル復調する変復調機能を有した無線回路部、7は無線回路部5によってデジタル復調された符号化音声信号を一時的に記憶してこの符号化音声信号をデジタル音声信号に復号するタイミングを調整すると共に、後述する記録部との間で符号化音声信号の記録・再生のタイミングをそれぞれ調整する受信側バッファ回路、8は音声処理回路部3によって符号化音声信号から復号されたデジタル音声信号をアナログの受話信号に変換するD/A変換器、9はマイク部1と共に音声入出力部を構成し、D/A変換器9の出力から外部に対して受話音声出力するスピーカ部である。

【0015】なお、無線回路部5のデジタル変調方式としては $\pi/4$ シフトDQPSK ($\pi/4$ shifted differentially encoded quadrature phase shift keying) 方式等が一般的に使用され、音声処理回路部3の符号化処理方式としては、VSELP (Vector-Sum Excited Linear Predictive Coding) 方式、PSI-CELP (Pitch Synchronous Innovation-Code Excited Linear Prediction) 方式等のデータ圧縮符号化方式が用いられる。これらの方式により符号化されたデータはVSELP方式であれば1フレーム20ms毎、PSI-CELP方式であれば1フレーム40ms毎の伝送速度でそれぞれ伝送される。

【0016】また、10は図2に示すように内部構成され、基地局に対する通話回線の割り当て要求など本発明に係る移動無線電話機の種々の動作制御を行う制御手段、11は無線回路部5によりデジタル復調された符号化音声信号を記録するメモリ等の記録部、12はダイヤルキーなどのテンキーにより構成され、外部から符号化音声信号の記録・再生など指示する操作部、13はダイヤル信号の発呼時に相手の電話番号を表示したり、記録した符号化音声信号の再生時に再生された符号化音声信号の回線品質等通信状態を表示する表示部であり、表示内容を表示パネルに文字表示させるものでも、対応する報知音を発生させるものでもよい。

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【0017】また、図2において、14はマイクロプロセッサ（以下、CPUという。）とROM及びRAM等とから構成され、CPUがこれらROM又はRAMに記憶された各種制御プログラム（例えば無線通信のために必要なプログラム、符号化音声信号の記録・再生に必要なプログラム又は後述の付属情報の作成に関するプログラム等）によって各部の制御を行う制御部、15は制御部14により付属情報作成の制御がなされ、音声処理回路部3から制御部14によって検出された有音又は無音の情報に基づき無音状態を示す付属情報を作成する付属情報生成部、16は記録部に記録する記録情報を作成する部分であって、無線回路部5によりデジタル復調された符号化音声信号のうち無音の信号区間を付属情報生成部15により作成した無音状態を示す付属情報に置き換え、かつ、記録情報の再生時に記録部11から読み出された記録情報を有音の符号化音声信号と付属情報とに分離する機能を有した記録情報作成分離部、17は制御部14からの指示により記録情報作成分離部16で作成した記録情報を記録部11に書き込み、かつ、記録情報の再生時には制御部14の指示により記録部11に記録されたを読み出す記録情報書込読出部、18は記録情報書込読出部17により読み出され、対応する符号化音声信号からそれぞれ分離された付属情報が入力され、この付属情報を付加して記録部11に記録した符号化音声信号の無音状態を識別する付属情報識別部である。

【0018】次に動作について、図3乃至図5を用いて詳細に説明する。図3は図1に示す本発明に係る移動無線電話機19の記録動作を示すフローチャート図、図4は移動無線電話機19の記録内容の再生動作を示すフローチャート図であり、まず本実施形態に係る移動無線電話機19の記録動作、特に通話相手の通話内容を記録する場合について図3を用いて説明する。なお、移動無線電話機19の通話時における通話動作については、送信系ではまず使用者が発声した音声信号がマイク部1によりピックアップされ、その後A/D変換器2、音声処理回路部3、送信側バッファ回路4、無線回路部5、アンテナ部6の順に伝達され、図示しない基地局を介して通話相手に送信され、受信系ではこれとは逆に基地局を介して送信された通話相手の音声信号が移動無線電話機19のアンテナ部6により受信された後、無線回路部5、受信側バッファ回路7、音声処理回路部3、D/A変換器8の順で伝達され、スピーカ部9から移動無線電話機19の使用者へ出力されることにより行われる。そして、この通話動作は通話終了指示により通信が終了するまで以上の要領で継続される。

【0019】以上のような通話状態において移動無線電話機19の使用者が通話相手の通話内容を記録部11に記録する場合、まず移動無線電話機19の使用者は、ステップ1aで操作部12に対し記録モードを選択するキー入力を行う。操作部12は記録モードを選択するキー

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入力が行われると制御部14に対して操作信号、ここでは記録動作を指示する記録指示信号を出力する。制御部14はこの操作部12からの記録指示信号により、通話動作に加え、内部に設けられたROM又はRAMに記憶した記録制御プログラムを読み出して以後の記録動作を実行する。

【0020】制御部14により記録制御プログラムが実行されると、まず音声処理回路部3がステップ2aで無線回路部5によりデジタル復調された符号化音声信号の有音又は無音状態をデジタル音声信号より判定する。音声処理回路部3はデジタル音声信号に復号化された符号化音声信号の有音状態又は無音状態を判定をするだけでなく、どの程度無音状態が継続しているか等の判定も行う。そして音声処理回路部3により判定された有音・無音情報を検出した制御部14がステップ3aで記録部11に記録する符号化音声信号の無音区間を判別する。ここで、有音区間と判別された符号化音声信号は、そのまま記録情報作成分離部16に伝送されるが、無音区間であると判別された符号化音声信号は、そのまま記録情報作成分離部16には伝送されず、まず制御部14から付
20 属情報生成部15にその無音情報が送られ、この付属情報生成部15によりステップ4aで無音状態を示す付属情報が作成される。そして、この無音状態を示す付属情報が記録情報作成分離部16へ送られてこの付属情報と有音の符号化音声信号とから記録情報作成分離部16が記録情報を作成する。即ち、無音の符号化音声信号をそのまま記録部11に記録すると無音の信号区間が長い場合には、有音の信号の記録許容量が削減されてしまうので、この無音と判定された区間の符号化音声信号をその無音状態を示す比較的データ長の短い信号に置き換えて
30 記録部11に記録するのである。そして、記録情報作成分離部16で例えば図5に示すように作成された記録情報は記録情報書込読出部17へ出力された後、制御部14によって書き込みタイミングが調整された記録情報書込読出部17により記録部11に記録される。

【0021】なお、図5は記録情報作成分離部16により作成され、記録部11に記録された記録情報の例であり、記録情報のデータ構成を示すデータ構成図である。記録部11にはnフレーム(nは1以上の整数。)の符号化音声信号20と4～9フレーム目の符号化データ
40 を付属情報21に置き換えた記録情報とが記録されている。また、図5では付属情報20は1フレーム単位の符号化データ毎に作成して置き換えられているが、数フレームをまとめて置き換えるデータ構成としても良い。

【0022】また、付属情報生成部15により作成される上記付属情報は、0、1データの組み合わせによって作成されるものであり、わずかに数ビットのデータにより無音の符号化音声信号と置き換えることができる。

【0023】なお、ステップ6aは記録情報書込読出部17が記録部11に記録したデータ量を制御部14が監

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視するステップであり、記録部11に所定値以上のデータ量が記録部11に記録されると制御部14は強制的に記録動作を終了する。また、ステップ7aは制御部14が操作部12からの記録中止信号を監視するステップであり、移動無線電話機19の使用者が操作部12によって記録中止モードを選択するキー入力を行い、操作部12から制御部14に対して記録中止信号が入力されると、制御部14はステップ6aと同様に記録動作を強制的に終了する。以上のように、本実施形態に係る本発明の移動無線電話機によれば、通話相手が話した通話内容を記録部11に記録する場合に、受信した符号化音声信号のうち無音の区間が長く継続した場合、その無音の符号化音声信号に代えてその無音状態を示す付属情報を記録部11に記録するようにしたので、記録部11内の無音の信号が記録される容量を削減でき、有音の符号化音声信号を長時間記録部11に記録できる。

【0024】次に再生動作について図4を用いて説明する。図3に示す要領で記録部11に記録した通話内容を本実施形態に係る移動無線電話機19の使用者が確認する場合、まず使用者は、ステップ1bで操作部12に対し再生モードを選択するキー入力を行う。操作部12は再生モードを選択するキー入力となされると制御部14に対して再生指示信号を出力する。制御部14はこの操作部12からの再生指示信号により、内部に設けられたROM又はRAMに記憶した再生制御プログラムを読み出して以後の再生動作を実行する。

【0025】制御部14により再生制御プログラムが実行されると、まず制御部14の指示により記録情報書込読出部17がステップ2bで記録部11から記録情報の読み出しを行う。記録情報書込読出部17に読み出された記録情報は上述したとおり有音の符号化音声信号と無音の付属情報とにより構成されており、記録情報作成分離部16によりステップ3bで無音を示す付属情報と有音の符号化音声信号とが分離される。分離された一方の属情報の方は記録情報作成分離部16により付属情報識別部18に伝送され、この付属情報識別部18によりステップ4bでその無音状態が識別がなされる。そして、識別された結果は制御部14に送られて無音の符号化音声信号に再び戻された後、記録情報作成分離部16により分離された他方の有音の符号化音声信号と共に受信側バッファ回路7を介して音声処理回路部3に伝送され、この音声処理回路部3がステップ5bでこれら符号化音声信号を復号化する。以上のようにして記録部11に記録された記録情報は復号化され、その後D/A変換器8、スピーカ部9を介して受話音声に再生される。

【0026】また、ステップ6bは制御部14が記録情報書込読出部17の記録情報の読み出しを監視するステップであり、記録部11から記録情報が全て読み出されると制御部14は強制的に再生動作を終了する。また、ステップ7bは制御部14が操作部12からの再生中止

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信号を監視するステップであり、移動無線電話機19の使用者が操作部12により再生中止モードを選択するキー入力を行い、操作部12から制御部14に対して再生中止信号が入力されると、制御部14はステップ6aと同様に再生動作を強制的に終了する。

【0027】実施の形態 2

次に、本発明の他の実施形態について説明する。上記実施形態では、無音の符号化音声信号を付属情報に置き換えることで、記録部に対する無音の符号化音声信号の記録容量を減らし、必要な有音の符号化音声信号の記録部への長時間の記録を実現しているが、この付属情報は、わずかに数ビットのデータで例えば符号化音声信号の無音状態を示すことができるので、その他記録部11に記録する符号化音声信号に関する回線品質などの情報を付属情報として作成し、この符号化音声信号の記録の際に併せて記録部11に記録させてもよい。このようにすれば、回線品質などの情報を余分なメモリを設けることなく符号化音声信号と同じ記録部に記録させることができ、かつ、記録した符号化音声信号の再生時に併せてこの符号化音声信号の回線品質に関する情報を例えば、表示部12に表示させることができる。

【0028】一般に、無線の通話回線を設定する移動通信システムの場合、この無線通話回線に接続して通話相手と通話を行っている各端末に対しては、通話回線の割り当てを行う基地局がその通話中の通話回線の回線品質、疑似誤り率などを送信している。また、このような無線回線により通話中の各端末が通話相手の話した内容を内部に設けたメモリに記録させる場合、これら通話相手との通信状態については何ら考慮されず、通信状態が悪くてもそのまま記録されており、記録した内容を後で再生した場合、回線品質が悪い場合にはその記録内容が聞き取ることができなかった。本実施形態に係る移動無線電話機は使用中の通話回線の回線品質、疑似誤り率などを示す付属情報を作成し、無線回路部によりデジタル復調された符号化音声信号を記録部に記録する場合にこの付属情報を付加して記録することにより、再生時には記録部に記録された符号化音声信号を復号化すると共に、復号化された符号化音声信号に付加された付属情報から対応する符号化音声信号の通信状態を読みとり、その通信状態に応じて再生した受話音声の出力レベルを調整する。

【0029】図6は本実施形態に係る移動無線電話機の構成を示すブロック構成図であり、図6を用いて本実施形態に係る移動無線電話機の動作について説明する。なお、図中同一符号は同一又は相当部分を示し、詳細な説明は省略する。また、本実施形態に係る移動無線電話機の制御部14は音声処理回路部3より検出した有音・無音情報に基づき付属情報生成部15に付属情報を作成させるのではなく、無線回路部5を介して受信した通話回線の通信状態を示す制御信号に基づき付属情報生成部1

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5に付属情報を作成させる動作プログラムを内部のROM又はRAMに有し、使用者が操作部12により記録モードを選択するキー入力をした場合には上記制御信号に基づく付属情報を作成する動作を行う。即ち、本実施形態に係る移動無線電話機では、操作部12によって記録モードが選択されるとまず制御部14が付属情報生成部15に制御信号に基づく付属情報を作成させ、次に記録情報作成分離部16で記録部11に記録する符号化音声信号に付属情報生成部15で作成した付属情報を付加して記録情報を作成し、最後に記録情報書込読出部17がこの記録情報を制御部14の記録タイミング指示により記録部11に記録する。

【0030】図7はこの実施形態における移動無線電話機の記録部に記録された記録情報のデータ構成を示すデータ構成図であり、図7において、21は通話相手の通話内容であって、音声処理回路部3によって復号された後、受話音声としてスピーカ部9から使用者に対して出力される符号化音声信号、22はこの符号化音声信号21に付加されて記録部11に記録された付属情報である。この付属情報は本実施形態に係る移動無線電話機と通話相手との間に設定された通話回線の回線品質（例えば、良好な状態を1、粗悪な状態を3とする等）を示すものであるが、その他に疑似誤り率など種々の通話中の通信状態を示す情報でもよい。また、図7に示す付属情報は1フレームの符号化音声信号毎に付加され、1フレーム毎の符号化音声信号について回線品質が示されているが、数フレームを1つのブロックにまとめてブロック毎に付属情報を作成すれば、さらに記録容量を減らせ、メモリの有効利用が図れる。

【0031】そして、再生時には、記録部11から付属情報22が付加された符号化音声信号21を読み出して音声処理回路部3により復号化、更にデジタル処理を施すと共に、制御部14がこの付属情報22から識別した符号化音声信号21の通信状態に基づいて音声入出力部の出力レベルを調整することにより（制御部14から付属情報の内容に応じた受話音声レベル指示信号が音声入出力部に対して出力される。）、たとえ、回線品質が悪い状態で記録した通話相手の通話内容でも聞き取りやすい状態で受話音声に再生できる。

【0032】また、上記実施形態に係る移動無線機では、例えば回線品質が悪い状態で記録したと判断すると自動的に受話音声の出力レベルを上げて再生した受話音声を出力させるので、電力の消費も出力レベルが低い場合に比べて大きくなる。また、自動的に出力レベルの調整が行われるので移動無線電話機の使用者は記録した符号化音声信号の通信状態の善し悪しを知ることができず、通信状態が悪い場所の特定ができない。これでは通話状態の悪い場所での記録を繰り返すことにもなりかねず、二次電池等の充電電池を電源部として使用し、かつ、常時使用状態で携行されるこの移動無線電話機の分野で

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は余計な電力の消費につながりあまり望ましくない。そこで、記録した内容の再生時に再生した受話音声の出力レベルの調整を行うと共に、付属情報から識別した符号化音声信号の通信状態を表示部13に表示させるようにしてもよい。この場合、表示部13の表示手段としては発呼時に通話相手のダイヤル番号などを表示する液晶画面の表示部でもよいし、通信状態に応じた報知音を発声する報知音発声手段を設けてもよい。

【0033】実施の形態、3

次に、本発明の他の実施形態について図8乃至図10を用いて説明する。本実施形態に係る移動無線電話機は複数の符号化方式が併用された移動通信システムに適用されるものであり、本実施形態に係る移動無線電話機では、記録部に記録された符号化音声信号を再生するとき各符号化音声信号の符号化方式に応じた正確な再生を実現するため、各符号化方式を示す付属情報の作成を行う。そしてこの付属情報を対応する符号化音声信号に付加して記録部に記録させ、再生時にはこの付属情報から識別された符号化方式を選択して記録部に記録した符号化音声信号を復号化させる。

【0034】図8は本実施形態に係る移動無線電話機の概略構成を示すブロック構成図であり、図9は制御手段の構成を具体的に示す部分構成図である。図8及び図9において、23は複数の符号化手段23a、23b及び復号化手段23c、23d（例えば方式1はVSELP方式、方式2はPSI-CELP方式）が設けられ、通話中は通話相手との間に設定された無線通話回線を構成する基地局と同じ符号化方式である符号化手段及び復号化手段が選択されている音声処理回路部、24は図9に示すように内部構成され、基地局による無線通話回線設定時、通話回線の割り当てに用いられる共通制御回線（Common Signalling Channel：以下、CSCという。）を介して基地局から送信された符号化方式を指定する信号を含んだ制御信号により、音声処理回路部3の各符号化手段及び復号化手段の中から通話相手との間に設定される通話回線を構成する基地局と同じ符号化方式のものを選択し、また操作部12からの記録指示信号により、無線回路部5によりデジタル復調された符号化音声信号を記録部11に記録する一連の動作制御を行う制御部、25は制御部24からの指示により記録部11に記録する符号化音声信号の符号化方式を示す付属情報を作成する付属情報生成部、26は記録部11に記録する符号化音声信号に付属情報生成部25により生成した付属情報を付加して記録情報を作成し、また記録部11から読み出した記録情報を符号化音声信号と付属情報とに分離する記録情報作成分離部、27は制御部24からの指示により記録情報作成・分離部26で作成した記録情報を記録部11に書き込み又は記録部11に記録された記録情報を読み出す記録情報書込読出部、28は記録情報書込読出部27により読み出

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され、符号化音声信号と分離された付属情報が入力され、この付属情報から記録部11に記録された符号化音声信号の符号化方式を識別する付属情報識別部である。なお、図中同一符号は同一又は相当部分を示し、詳細な説明は省略する。

【0035】また、図11は図8に示す本実施形態に係る移動無線電話機29が用いられる移動通信システムを示すシステム構成図であり、公衆回線網に接続した回線制御局30に複数の基地局K_n（ n は1以上の整数。）がそれぞれ接続されて複数の無線ゾーンE_n（ n は1以上の整数。）からなる通信エリア31が形成されている。また、図11において、基地局K1はVSELP方式、基地局K2はPSI-CELP方式の符号化方式をそれぞれ採用しているものとし、移動無線電話機29はまず基地局K1が形成する無線ゾーンのA点において通話相手と通話回線T1により通話を行い、その後、通話を継続したまま基地局K2が形成する無線ゾーンのB点に移動している状態（b点では通話回線T2により通話を行。）を示している。

【0036】次に動作について図11乃至図13を用いて詳細に説明する。図11は図8に示す本実施形態に係る移動無線電話機29の記録動作を示すフローチャート図、図12はその記録した記録内容の再生動作を示すフローチャート図であり、まず移動無線電話機29の記録動作について図11を用いて説明を行う。なお、図11に示すフローチャート図は、移動無線電話機29が図10に示す状態で通話相手の話した通話内容を記録部11に記録する場合の動作について示している。A点において、通話回線T1により通話相手と通話を行っている移動無線電話機29の使用者が通話相手の通話内容を記録部11に記録する場合、まずその使用者が操作部12に対し記録モードを選択するキー入力を行う（ステップ1c）。操作部12は記録モードを選択するキー入力が行われると制御部24に対して記録動作を指示する記録指示信号を出力する。制御部24はこの操作部12からの記録指示信号が入力されると、通話動作に加え、内部に設けられたROM又はRAMに記憶した記録制御プログラムを読み出して以後の記録動作を実行する。

【0037】制御部24は記録モードの選択により記録制御プログラムを実行すると、まず無線回路部5によりデジタル復調された符号化音声信号の符号化方式を判別する（ステップ2c）。本実施形態に係る移動無線電話機29では、符号化方式の判別はCSCを介して基地局から送信される制御信号に含まれた符号化方式の指定信号に基づいて行うので、あとで通話回線が切り替わった場合にも、その新たな無線通話回線の設定時に切り替わった無線通話回線を構成する基地局の使用符号化方式が判別できる。そして制御部24はまず付属情報生成部25にこの判別結果に応じた付属情報を作成させ、次に記録情報作成分離部26でこの符号化方式を示す付属

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情報を符号化音声信号に付加して記録情報を作成させ、最後に記録情報書込読出部27によってこの記録情報を記録部11に書き込ませる(ステップ3c)。また、ステップ4cは記録情報書込読出部27が記録部11に記録したデータ量を制御部24が監視するステップであり、記録部11に所定値以上のデータ量が記録部11に記録されると制御部24は強制的に記録動作を終了する。ステップ5cは制御部24が操作部12からの記録中止信号を監視するステップであり、移動無線電話機29の使用者が操作部12によって記録中止モードを選択するキー入力を行い、操作部12から制御部24に対して記録中止信号が入力されると、制御部24はステップ4cと同様に記録動作を強制的に終了する。

【0038】また、ステップ6cは無線通話回線の切り替わりを監視するステップであり、通話相手との間に設定された無線通話回線T1が移動無線電話機29の移動によって無線通話回線T2に切り替わった場合、制御部24はステップ2cに戻り、再びCSCを介して基地局K2から送信された制御信号に基づき切り替わった無線通話回線T2を構成する基地局K2の使用符号化方式を判別する。無線通話回線T1が切り替わらなければステップ3c乃至5cを記録終了までそのまま継続する。なお、図10のc点の位置における移動無線電話機29と通話相手との間の無線通信回線はT1又はT2のいずれにも設定されうるが、通常は各基地局が接続された回線制御局30(網側)が、各基地局のチャンネル使用状態、例えばトラフィック状態を監視しており、この網側の判断によっていずれの無線通話回線に接続すべきが基地局K1又は基地局K2を介して移動無線電話機29に対して指示される。この指示はCSCを介し、上記制御信号により行われる。また、移動無線電話機29から各基地局K1又はK2に送信された送話信号の電波強度を各基地局が検出し、この電波強度の強い基地局の方の無線通信回線に接続するよう指示しても良い。図13は以上のようにして記録部11に記録された記録情報のデータ構成を示すデータ構成図である。

【0039】図13において、32は記録部11に1フレーム毎に区別して記録されたnフレーム(nは1以上の整数。)の符号化音声信号、33は符号化音声信号32に付加された付属情報である。図13中、VはVSELP方式、PはPSI-CELP方式を示す。図12に示すように符号化方式を示す付属情報33は1フレームの各符号化音声信号毎にそれぞれ付加されている。

【0040】また、図14は記録部11に記録された記録情報の他のデータ構成を示すデータ構成図である。図13では、付属情報が1フレーム毎に作成され、対応する各フレームの符号化音声信号に付加されているが、制御部24による符号化方式の識別の結果符号化方式が変化した場合、即ち無線通話回線が他の符号化方式を用いている基地局の通話回線に切り替わった場合(図10に

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示すように移動無線電話機29の位置がa点からc点に移動した場合)に、その先頭のフレームの符号化音声信号にのみ付属情報を付加させても良い。なお、図13中、Kは符号化方式を示し、この符号化方式KがK+1に切り替わった場合にその符号化方式に対応した付属情報Pを付加する。

【0041】次に再生動作について図12を用いて説明する。図11に示す要領で記録部11に記録した通話内容を本実施形態に係る移動無線電話機29の使用者が確認する場合、まず使用者は操作部12に対し再生モードを選択するキー入力を行う(ステップ1d)。操作部12は再生モードを選択するキー入力となされると制御部24に対して再生指示信号を出力する。制御部24はこの操作部12からの再生指示信号により、内部に設けられたROM又はRAMに記憶した再生制御プログラムを読み出して以後の再生動作を実行する。

【0042】制御部24によって再生制御プログラムが実行されると、まず記録情報書込読出部27が制御部24の指示により記録部11から例えば、図13に示す記録情報の読み出しを行う。次に読み出された記録情報は記録情報作成分離部26により符号化方式を示す付属情報33とこの付属情報33に示された符号化方式の符号化音声信号32とに分離される。分離された一方の符号化音声信号32は受信側バッファ回路7を介して音声処理回路部3に伝送され、後述の選択された復号化手段によってデジタル音声信号に復号化されるが、この復号化手段の選択は付属情報識別部28の付属情報の識別に基づいて行われる。即ち、この付属情報識別部28が記録情報作成分離部26によって分離された他方の付属情報33から符号化方式を識別し、制御部24がこの識別結果に応じて分離された一方の符号化音声信号の符号化方式に対応した復号化手段を選択する(ステップ2d)。復号化手段の選択は、制御部24が符号化方式選択信号を音声処理回路部3に対して出力することにより行う。そして、記録情報作成分離部26によって分離された一方の符号化音声信号32は制御部24によって選択された復号化手段によってデジタル音声信号に復号化される(図13でいえば、符号データ1及び2はVSELP方式で復号化され、符号化データnはPSI-CELP方式で復号化される。)。この選択された復号化手段により復号化されたデジタル音声信号はその後D/A変換器8、スピーカ部9を介して受話音声に再生される(ステップ3d)。

【0043】また、ステップ4dは制御部24が記録情報書込読出部27の記録情報の読み出しを監視するステップであり、記録部11から記録情報が全て読み出されると制御部24は強制的に再生動作を終了する。また、ステップ5dは制御部24が操作部12からの再生中止信号を監視するステップであり、本実施形態に係る移動無線電話機29の使用者が操作部12により再生中止モ

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ードを選択するキー入力を行い、操作部12から制御部24に対して再生中止信号が入力されると、制御部24はステップ4dと同様に再生動作を強制的に終了する。

【0044】実施の形態 5

また、上記実施形態に係る移動無線電話機は、無線回路部5によってデジタル復調された符号化音声信号をすべて記録部11に記録するようにしたが、記録部に記録する際に復号化に必要なデータ（Aクラス）とそれ以外のデータ（Bクラス：音質に関するものなど）とに区別して、このAクラスのデータのみ選択して記録部11に記録するようにしても良い（メモリ節約モード）。例えば、使用者が操作部12より記録指示を行う際に併せてメモリ節約モードを選択できるようにする。このようにすれば、再生時の受話音声は多少劣化するが、記録部11に記録される符号化音声信号の記録容量を削減でき、更に長時間分の符号化音声信号を記録部11に記録させることができる。

【0045】図15は本実施形態に係る移動無線電話機の記録部11に記録された記録情報のデータ構成を示すデータ構成図であり、34は通常時に記録された記録情報、35はメモリ節約モードが操作部12により選択された場合に記録部11に記録された記録情報をそれぞれ示す。図15に示すようにメモリ節約モードが選択された場合にはAクラスの符号化データのみが記録部11に記録される。

【0046】

【発明の効果】以上のように、請求項第1項の発明によれば、基地局から送信された被変調波音声信号を受信して符号化音声信号に復調する無線回路部と、この無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、この音声処理回路部により復号された上記デジタル音声信号から上記被変調波音声信号に対応する受話音声を入力する音声入出力部と、上記符号化音声信号が記録される記録部と、上記音声処理回路部により復号された上記デジタル音声信号の有音又は無音状態に応じて上記記録部に記録する上記符号化音声信号の無音状態を示す付属情報を生成する付属情報生成部と、上記デジタル音声信号を検出し、上記記録部に記録する上記符号化音声信号が無音状態のときには上記付属情報生成部により生成した上記付属情報を上記無音の符号化音声信号に代えて上記記録部に記録する制御部とを設けたので、受信した無音の符号化音声信号は無音を示す付属情報に置き換えられて記録部に記録され、有音の符号化音声信号のみがそのまま記録部に記録されるので、無音の符号化音声信号の記録部への記録容量を削減でき、記録部に長時間有音の符号化音声信号を記録できる。

【0047】また、請求項第2項の発明によれば、通話回線を介して受信した基地局からの被変調波音声信号を符号化音声信号に復調する無線回路部と、この無線回路

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部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、この音声処理回路部により復号された上記デジタル音声信号から上記被変調波音声信号に対応する受話音声を入力する音声入出力部と、上記基地局から送信された上記通話回線の回線情報により上記被変調波音声信号の通信状態を示す付属情報を生成する付属情報生成部と、この付属情報生成部により生成された上記付属情報が付加された上記符号化音声信号を記録する記録部と、上記記録部に記録された上記符号化音声信号を上記受話音声へ再生するときに上記符号化音声信号に付加して記録された上記付属情報を読み出して再生される上記符号化音声信号の通信状態を識別し、この識別結果に応じて再生された上記受話音声の出力レベルを調整する制御部とを設けたので、記録部に長時間の通話内容を記録することができると共に、記録部に記録情報の再生時に記録した符号化音声信号の回線品質、疑似誤り率等に対応して受話音声の出力レベルを調整できる。

【0048】また、請求項第3項の発明によれば、上記制御部は上記受話音声に再生された上記符号化音声信号の通信状態を表示部に表示させるので、記録情報の再生時に記録した符号化音声信号の回線品質、疑似誤り率等が使用者に対して表示又は報知され、記録した位置の通信状態が認識できる。

【0049】また、請求項第4項の発明によれば、基地局から送信された被変調波音声信号を受信して符号化音声信号に復調する無線回路部と、複数の復号手段が設けられ、上記無線回路部により復調された上記符号化音声信号をデジタル音声信号に復号する音声処理回路部と、上記デジタル音声信号から上記被変調波音声信号に対応する受話音声を入力する音声入出力部と、上記基地局から送信された上記被変調波音声信号の符号化情報から上記符号化音声信号の符号化方式を示す付属情報を生成する付属情報生成部と、上記付属情報が付加された上記符号化音声信号を記録する記録部から上記符号化音声信号を読み出して受話音声に再生するときに、上記符号化音声信号に付加して記録された上記付属情報を読み出して上記符号化音声信号の符号化方式を識別する付属情報識別部と、この付属情報識別部により識別された符号化方式に応じた所定の上記復号手段によって上記記録部に記録された上記符号化音声信号を上記デジタル音声信号に復号させる制御部とを設けたので、通話内容を記録中に通信回線が他の基地局の回線に切り替わり、異なる符号化方式で符号化された複数種類の符号化音声信号を記録した場合にも各符号化音声信号をその符号化方式に対応した復号化手段により復号化して記録内容の連続した再生ができ、かつ、記録部に長時間の符号化音声信号の記録ができる。

【0050】また、請求項第5項の発明によれば、上記制御部は上記符号化音声信号の内、受話音声への再生に

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必要な符号化音声信号を選択して上記記録部に記録するので、記録部に記録される符号化音声信号の記録容量をさらに削減でき、長時間分の符号化音声信号を記録部11に記録させることができる。

【図面の簡単な説明】

【図1】 この発明の一実施形態による移動無線電話機を示すブロック構成図である。

【図2】 図1に示す移動無線電話機の制御手段を示すブロック構成図である。

【図3】 図1及び図2に示す移動無線電話機の記録動作を示すフローチャート図である。

【図4】 図1及び図2に示す移動無線電話機の再生動作を示すフローチャート図である。

【図5】 図1及び図2に示す移動無線電話機の記録部に記録された記録情報のデータ構成図である。

【図6】 この発明の実施形態、2による移動無線電話機の制御手段を示すブロック構成図である。

【図7】 図6に示す移動無線電話機の記録部に記録された記録情報のデータ構成図である。

【図8】 この発明の実施形態、3による移動無線電話機を示すブロック構成図である。

【図9】 図8に示す移動無線電話機の制御手段を示すブロック構成図である。

【図10】 図8及び図9に示す移動無線電話機が適用

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される移动通信システムを示すシステム構成図である。

【図11】 図8及び図9に示す移動無線電話機の記録動作を示すフローチャート図である。

【図12】 図8及び図9に示す移動無線電話機の再生動作を示すフローチャート図である。

【図13】 図8及び図9に示す移動無線電話機の記録部に記録された記録情報のデータ構成図である。

【図14】 図8及び図9に示す移動無線電話機の記録部に記録された記録情報の他のデータ構成図である。

【図15】 メモリ節約モード選択時に本発明に係る移動無線機の記録部に記録された記録情報のデータ構成図である。

【符号の説明】

3、23 音声処理回路部

5 無線回路部

9 スピーカ部

10 制御手段

11 記録部

12 操作部

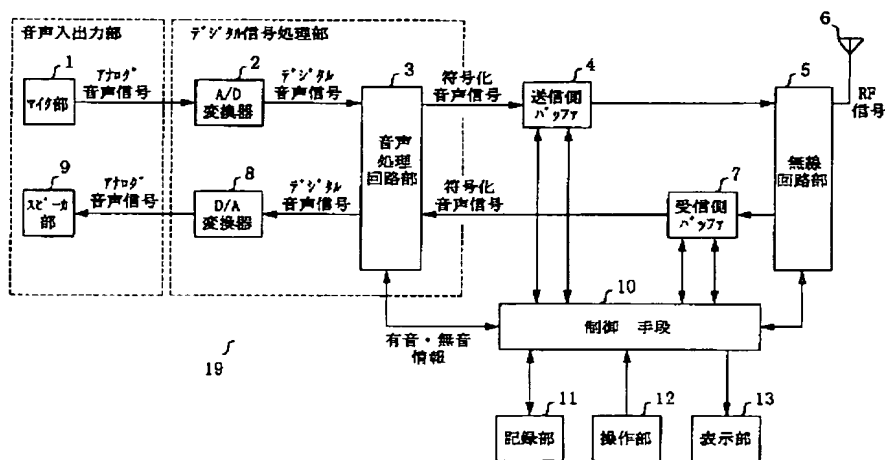
13 表示部

14、24 制御部

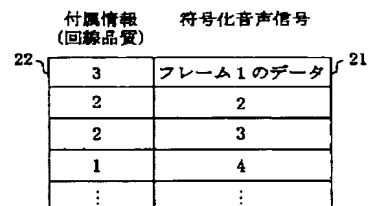
15、25 付属情報生成部

18、28 付属情報識別部

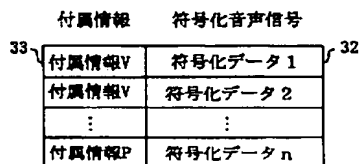
【図1】



【図7】

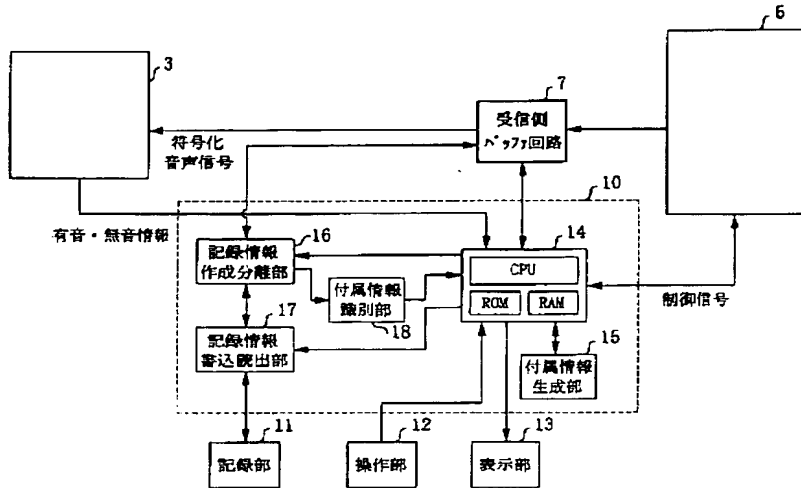


【図13】

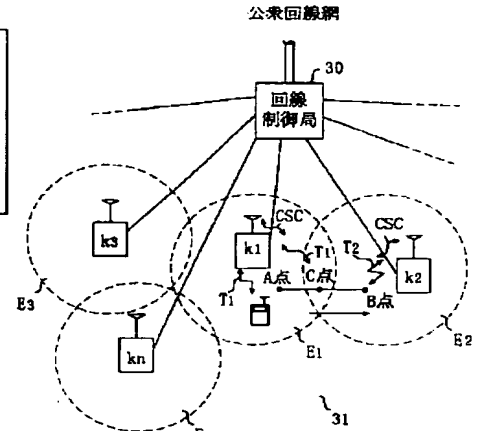


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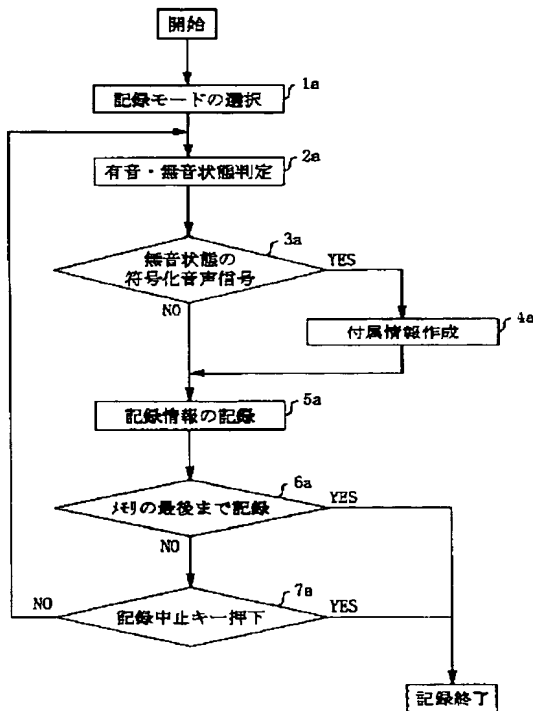
【図2】



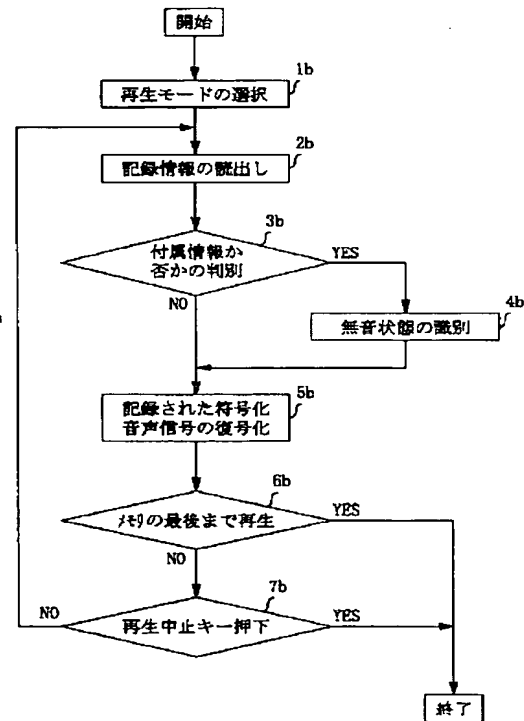
【図 10】



【図 3】

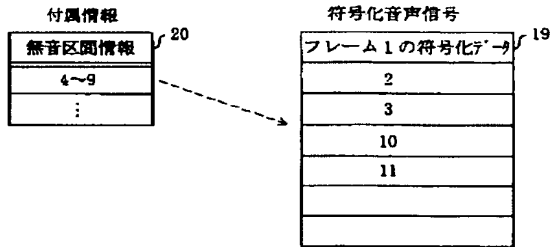


【図 4】

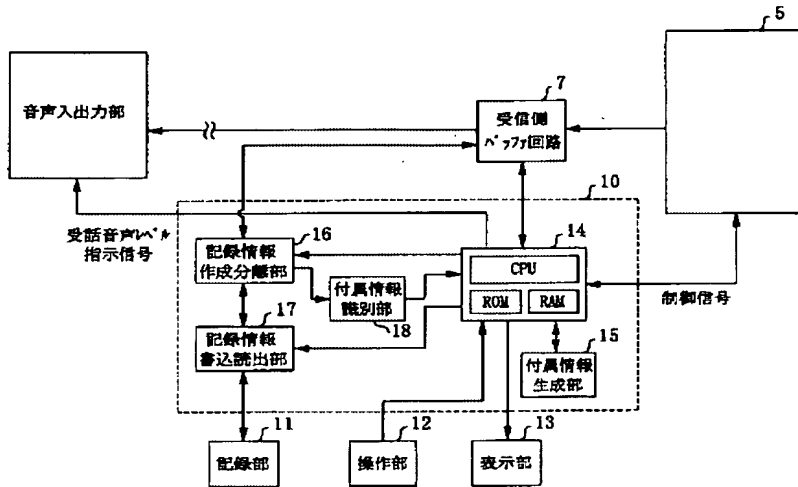


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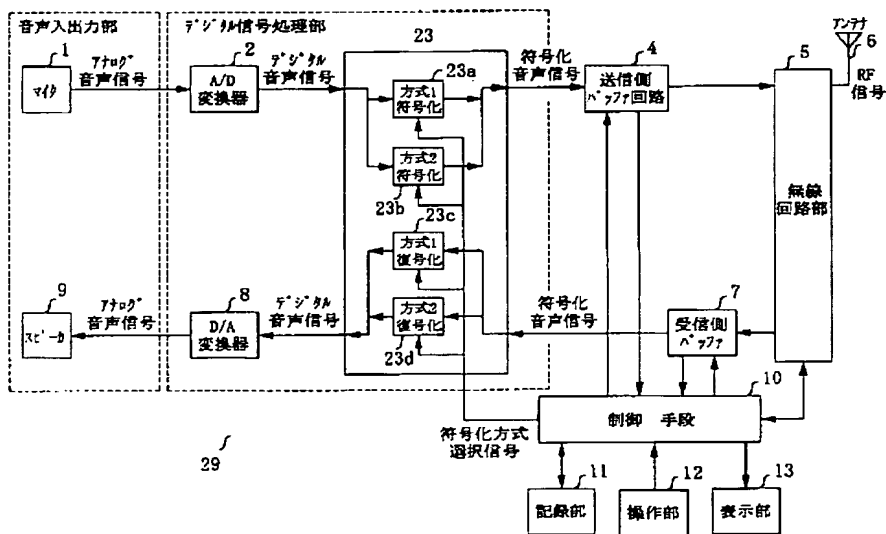
【図5】



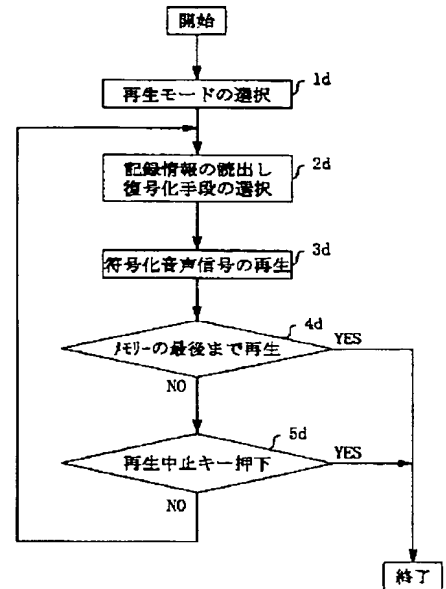
【図6】



【図8】

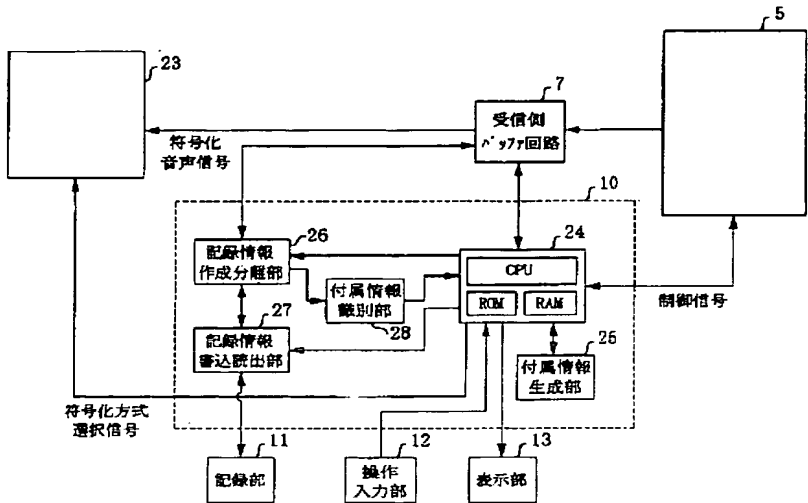


【図12】

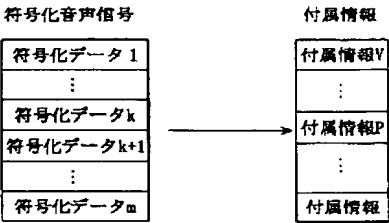


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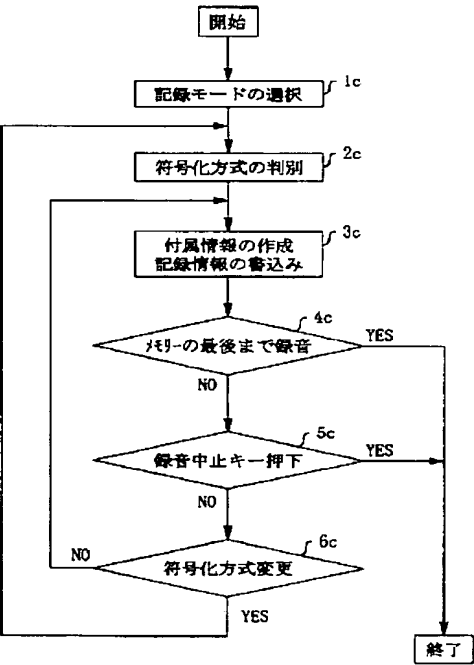
【図9】



【図14】



【図11】



【図15】

